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HERE'S ACTUAL PROOF OF STUDEBAKER SUPERIORITY OVER THE AVERAGE OF ALL CARS

In this issue of Motor Age you will find comparative specifications and a review of the new models of the leading American cars.

IN SPECIFICATIONS

Turn to pages in this issue containing specifications of various cars and blue pencil the Studebaker specifications. Read them carefully—and then compare them, point by point, with the other cars in the Studebaker price range. Then compare Studebaker specifications, point by point, with cars costing more than Studebaker cars—and see for yourself just what it costs to obtain the same essentials of good motor car construction.

See if you can find another four-cylinder car at \$940 with a $3\frac{7}{8}$ -inch bore x 5-inch stroke, forty horse power motor, a full-floating rear axle with complete equipment of Timken bearings, and with plenty of room for seven people in comfort, for anywhere near the price.

Take the specifications of all the six-cylinder cars listed—and note what you have to pay to obtain the full fifty horse power of the Studebaker "Six," the 122-inch wheelbase, seven-passenger capacity, full-floating rear axle and complete equipment of Timken bearings. See if you will find, in either a Four or a Six, individual and adjustable front seats, a reversible seat next to driver's, arm-chair auxiliary seats, and a host of other Studebaker conveniences at anywhere near the Studebaker price.

These are specific facts—they actually show where the Studebaker specifications, in comparison with the specifications of other cars, offer higher quality and greater value.

IN COMPARATIVE ANALYSIS

And, point by point, this analysis made by "Motor Age" in a purely unprejudiced way, proves that every important feature of Studebaker construction has been adopted by the majority of motor car builders.

It shows that every important feature of Studebaker construction is used either by the largest number of makers, or by those makers whose cars sell for a much higher

price than Studebaker. "Motor Age" comparative analysis this week gives proof that not only in power, but in every important feature of construction, regardless of cost, Studebaker uses designs recognized by the majority of engineers as the best—and it offers further convincing proof that Studebaker is the world's leading manufacturer of fine cars.

STUDEBAKER

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MOTOR AGE

Out of the Chrysalis of Past Effort

by Darwin S. Hatch

IT may not be wholly a novel idea to compare mechanical inventions and developments with the evolution of a butterfly, but in the case of the motor car, particularly as it applies to motor cars of 1917, this may be considered agreeable in some respects. From the not generally admitted mechanism of several years ago, whose chief object was to provide a means of locomotion which would operate with some degree of automaticity, the motor car has developed until it was as becoming the ungainly eight-wheeled monster into a thing of beauty. Whether or not it is a far better something is a matter of opinion.

At any rate, it is a thing that is no longer a mere machine, but a thing that is a part of the human world, a thing that is a part of the human world.

been developed before. The car has become a beautiful vehicle from an artistic standpoint as well as a utilitarian vehicle. The new cars combine the features of comfort and elegance to a degree hitherto unthought of and at the same time have been developed mechanically during the last year or more, more so than of any other year and time that could be termed a period of mechanical individuality.

With the opening of the annual motor car exhibition, sponsored by the Grand Central Palace, New York, American cars are best represented by the greatest line of mechanical machinery in the country, the Ford cars. This is the first time that a car has been shown in America since 1915.

At the same time, the Ford cars are

season this new type is being exploited by a very respectable number of car makers. This body is variously known as the Springfield type, semi-limousine, touring-limousine, open-limousine, open-sedan and so on.

Comfort Features

Some of the other comfort features which mark advancement for the new season are the heaters for winter driving. Such are not fitted ordinarily as regular equipment, but both Haynes and Owen-Magnetic include Perfection heaters in their closed cars. Pathfinder supplies cigar lighters for the smokers. Another comfort feature is the inclusion of Hartford shock absorbers on the Haynes, and Gabriel snubbers on the Cadillac.

The comfort of the driver not always has been a prime consideration, but this year seems to have been taken into the designers' plans to a greater extent than previously. Adjustable steering columns, such as that on the Westcott, which can be raised or lowered, makes driving easier; the adjustable driver's seat, such as the Haynes has in a cloverleaf model, makes driving more easy. Better arrangement of

the emergency and gearshift levers so that they will be easily reached without bending may be seen in the Jeffery, Kissel, Velie and Dort. Adjustable pedals have become the rule.

From the standpoint of external appearance, the improvement is marked. Straight lines from radiator to windshield, straight-side bodies, some with rolled edges and higher sides, all have had their effect in the improvement. The general tendency toward the rounded or barrel type of hood, of course, is the main factor. One of the most striking examples of this idea is the Franklin, one of the most conservative as to changes of this nature. The Franklin hood now has a smoothly rounded contour, which approaches in idea the original barrel type of engine hood which distinguished the air-cooled car years ago.

Probably the most pronounced movement in body styles is the rapid coming into popularity of the four-passenger roadster. The majority of the manufacturers during the past year have announced this new outgrowth of the three-passenger cloverleaf design. A number of others have accomplished the same results by what approaches more nearly a four-passenger touring car. Perhaps the difficulty that has prevented it coming before has been the fact that it is not at all easy to design a close-coupled body for four and have it sporty-looking with two occupants and at the same time comfortable when four are carried. The problem of leg room for rear passengers of average size without too long a cockpit is a difficult one.

One car, the Anderson, has carried out this idea to its logical conclusion with a folding rear deck behind the driver's seat, this deck disappearing when four are to be accommodated.

The newest idea of this nature, and one which offers many possibilities, is the new two or four-passenger sporting roadster of the Paige company. This has the convertible idea so far as expansion for passengers is concerned, carried out to the last degree.

Individuality Provided

There is one feature in the motor car arrangements for this year which the motorist will appreciate, and that is the increase in opportunities for individuality in body styles and colors. Custom body building arrangements, provided by such firms as Studebaker, Locomobile, Singer and others, permit the purchaser to have a body built to his own design by the factory that builds the chassis.

In addition, there is a greater range in color options than was presented before. Most of the very high priced concerns have this feature. The Scripps-Booth now has this in restricted form, changing colors in a few weeks and offering options of color combinations.

The development for the new year has not been entirely in the body. In fact, widespread refinements are found through-

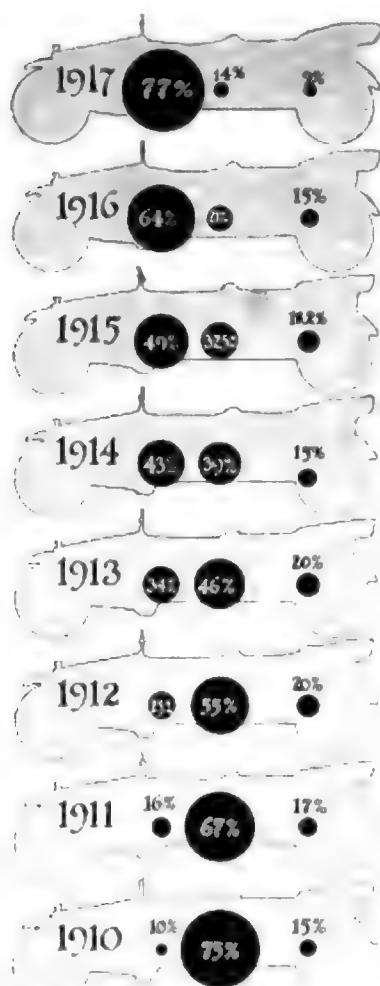
out the chassis. Perhaps the one real feature of the year from a mechanical standpoint which can be considered a possible trend for later consideration is the sixteen-valve engine, the engine having double intake and double exhaust valves in each cylinder. Now that White has joined the Stutz as the second exponent of this type to produce in quantities, the movement seems to be really under way. The first one announced was the Aland, a car which is not yet in large quantity production. As an answer to the multiple-cylinder question, this may have its effect in further development of the fours. The Buick recent announcement of a small four, in addition to the sizes which have been its sole production for 2 years, gives strength to this possibility of a consideration in some quarters of a possible return to the four.

Unification of Power Plant

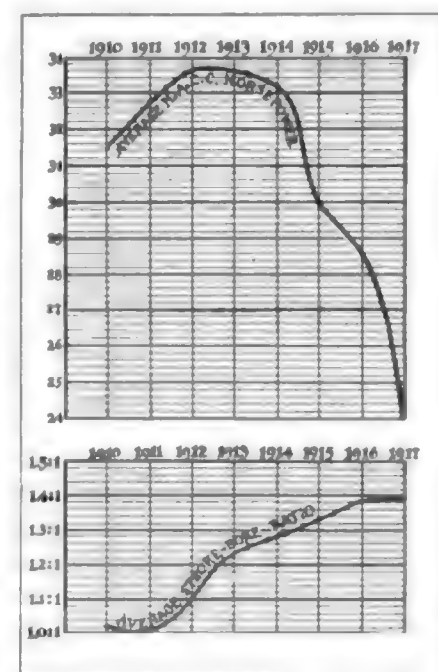
The move toward unification of the power plant has been going on during the past year. This is a tendency which has been in evidence for the past 4 years. By far the majority of the new cars have the gearset in unit with the motor, the most recent converts being the Jeffery Six and the new White sixteen-valve four. Previously both the Jeffery Six and the White had the gearset amidships.

There is a trend toward the overhead-valve engine replacing both the T-head and the L-head. It is particularly noticeable in connection with the coming of the sixteen-valve engine. Both White and Stutz use an overhead-valve design, the former having an L-head and the latter a T-head.

Buick, which for the past few years has



Movement of the gearset from its mid-ship location to right behind the engine during eight years as indicated by the percentage of chassis models with gearsets amidships, and in unit with the motor. The constant proportion is shown.



Upper curve—How the horsepower rating of the engine has varied since 1910 as indicated by the average of all chassis models announced each year. Lower curve—after similar curve for the ratio of stroke to bore.

confined itself to sixes, has added a four. Detroit has added a six, Willys has added a Knight eight, and Chevrolet has added an eight. The twelve-cylinders have remained in status quo, as there have been neither additions nor reductions in the list of twelves during the year.

Among the cars in which the four-cylinder models have been dropped are the Auburn, Jackson, Kissel, Lexington, Oakland, Oldsmobile and Simplex. The Pathfinder has dropped its six and is contemplating only twelves. Pullman, Standard and Stearns-Knight likewise have discontinued the sixes. Abbott, Mitchell and Partin-Palmer no longer are listing eights for 1917.

Spiral teeth in the main bevel gears of the final drive has increased very perceptibly. The Overland 85 now has spiral-bevel as has the Dodge, Reo, White, Willys-Knight, Jeffery Six, Cameron, Davis, Elcar, Empire, Paterson and Richmond. The proportion of chassis equipped with spiral-bevel drive has increased from approximately one-half of the chassis models of 1916 to nearly three-quarters of the new models.

Wire wheels have been made more uniformly stock equipment than has been the case previously. Several of the concerns which offered only wood last year have made wire wheels optional on the 1917 cars and others, notably Stutz, Singer and Cameron are making wire wheels stock.

Semi-Elliptic Rear Springs

Rear suspension has undergone quite a marked change during the past season. This is toward the flatter type of spring, such as the cantilever and semi-elliptic spring replacing the three-quarter elliptics which have been in vogue before. The semi-elliptic spring in particular has quite a following for the first time this year. Such concerns as Buick, Cole, Fiat, Marion-Handley, Oakland, and White as well as Auburn, Luverne, Davis and others have specified semi-elliptic springs usually replacing the three-quarter elliptic. Overland, Willys-Knight and Chevrolet are fitting cantilever springs this year instead of the three-quarter elliptic of last year.

Methods of conveying the fuel from the supply tank to the carburetor have undergone a very radical change in favor of the vacuum gravity and similar systems. In practically three-quarters of the chassis, listed for the new year, vacuum feed from the main tank in the rear to the gravity feed from the supplementary tank is employed. Last year there was approximately one half of the chassis models so equipped.

Single ignition is in favor with the greater proportion of the cars, better than four-fifths of the new motors having but one source of ignition supply, this being either the magneto or a generator-battery system. Double ignition this year has had a slight increase so far as the percentages of chassis models go. This is noticeable due to the fact that for the past 7 years double ignition has been on the wane.

Comparisons of Average American Car for 8 Years

GENERAL AVERAGES									
	1917	1916	1915	1914	1913	1912	1911	1910	
Horsepower, N.A.C.C. rating.....	24.3	28.66	29.97	33.2	33.60	33.60	32.7	31.5	
Bore	3.37	3.57	3.57	4.12	4.19	4.34	4.42	4.55	
Stroke	4.66	4.97	5.10	5.28	5.16	4.97	4.46	4.68	
Stroke-bore ratio	1.38	1.39	1.33	1.28	1.23	1.09	1.01	1.03	
Piston displacement.....	222.5	278.87	307.38	349	345	316.2	313.2	281.5	
Wheelbase	113.25	119.56	122.19	121	122	121	114	112	
Gear ratio	4.15-1	4.08-1	3.88-1	3.6-1	3.57-1	3.62-1			
Tires	31x3 1/2	33x4 1/2	34x4	35x4 1/2	35x4 1/2	35x4	34x4	34x4	
Number cars	644	519	535	607					
Number chassis	194	176	200	236	339	381	393	364	
Number makes	138	108	119	133	156	193	270	239	
Price	\$1,687	\$1,600	\$2,005	\$2,635	\$2,585	\$2,508	\$2,560	\$2,214	
PERCENTAGE									
Number of Cylinders									
One cylinder	0	0	0	0	1	1	8		
Two cylinders	0	0	5	1	1	2	3		
Four cylinders	37	39.2	51.0	54	62	78	80	82	
Five cylinders	0	0	0	0	1	1	0	0	
Six cylinders	47	45.8	47.5	48	38	19	17	10	
Eight cylinders	12	12.6	1.0	0	0	0	0	0	
Twelve cylinders	4	2.4	0	0	0	0	0	0	
Shape of Cylinders									
T-cylinder type	5	13.7	16.5	30	31	30	22	20	
L-cylinder shape	73	73.3	70.0	59	56	55	60	56	
I-cylinder type	20	13.0	8.5	6	9	8	14	18	
Knight type	2	3.6	3.0	3	2	1	0	0	
Two-cycle	0	0	1.0	1	1	4	3	6	
Monnex-Magic type	0	0	0	1	0	0	0	0	
Gasoline electric	0	1	0	0	0	0	0	0	
Cylinder Arrangement									
Cylinders cast separate.....	1	4.5	4.0	6	15	22	28	39	
Cylinders cast in pairs.....	5	10.2	27.0	42	46	54	60	63	
Cylinders cast in block.....	57	78.4	67.8	39	29	18	12	8	
Cylinders cast in threes.....	7	6.6	10.5	13	8	2	0	0	
Cooling									
Air-cooled	38	38.2	27	19	17	19	28	23	
Thermo-Syphon	62	61.2	72.5	79	79	76	66	70	
Ignition Systems									
Single ignition	84	76.0	56	23	15	14	18	25	
Dual ignition	9	19.2	36	59	68	63	53	40	
Two-spark ignition	1	1.2	1.45	4	2	0	0	0	
Double ignition	3	1.8	4.55	11	15	23	29	35	
Duplex ignition	1	1.8	2.0	3	0	0	0	0	
Dual-double	2								
Motor Lubrication									
Splash oiling	35	52.7	44.5	42	53	68	81	0	
Splash pressure oiling	35	23.35	16	39	32	20	0	0	
Oil in fuel	0	0	0	1	2	3	6	0	
Pressure oiling	30	23.35	37.5	18	14	10	19	0	
Splash gravity	0	0	0	0	0	0	0	0	
Engine starting									
Electric starter	99	98.8	94.5	87	37	2	0	0	
Acetylene starter	0	0	0	1	14	0	0	0	
Air starter	0	0	0	4	9	2	1	1	
Optional starter	0	0	1.5	2	5	0	0	0	
Mechanical starter	0	0	0	5	4	0	0	0	
No starter as stock	1	1.2	3.5	5	31	98	99	99	
Fuel Feed									
Gravity fuel feed	18	31.8	57	58	65	75	81	82	
Gravity-pressure fuel feed	1	2.4	5	1	0	0	0	0	
Pressure fuel feed	7	12.0	22	41	35	25	18	18	
Vacuum feed	74	53.8	20.5	0	0	0	0	0	
Type of Clutch									
Disc clutch	68	53.4	51	46	52	44	51	49	
Cone clutch	30	45.6	44	41	45	52	47	39	
Expanding band clutch	0	0	5	3	1	3	2	6	
Contracting band clutch	0	0	4.5	5	2	1	1	3	
None	1			3					
Electric	1	1	0	0	0	0	0	0	
Type of Gearset									
Selective	98	96.5	91.5	85	94	82	90	85	
Progressive	0	1.7	3.5	1	2	5	1	8	
Planetary	0	0	1.0	1	1	2	4	4	
Friction	1.5	1.2	2.5	3	3	1	5	3	
Location of Gearset									
Amidship	14	20.8	22.3	39	46	56	67	75	
Unit with axle	9	15.3	18.2	16	20	20	17	15	
Unit with motor	77	64.1	49.3	43	34	25	16	10	
None				3					
Wheels									
Wire wheels—demountable	10	6.5	7.0	3	3	8	8	8	
Wood wheels	79	82.5	88.5	96	96	100	100	100	
Optional	11	11.0	4.5	0	0	0	0	0	
Final Drive									
Shaft and bevel	28	41.0	54.5	93	94	92	91	89	
Chain	1.5	1.7	4.5	4	4	6	8	11	
Shaft and worm	5	5	1.5	1	1	1	0	0	
Roller	0	0	0	1	1	1	1	0	
Shaft and spiral—bevel	70	54.8	9.5	1					
Type of axle									
Floating	43.5	51.8	56.5	65	67	50	0	0	
Semi-floating	25.5	23.6	21.0	17	26	49	8	0	
Three-quarter floating	29.5	22.8	18.5	14	4	0	0	0	
Seven-eighths floating	0	0	0	1	0	0	0	0	
Dead rear axle	1.5	0	2.0	3	3	1	0	0	
Timing gear drive									
Spur gear	4	8.4	16.1	13	83				
Helical or spiral gear	74	73.0	73.7	77	10				
Silent chain	21	18.1	9.1	10	7				
Worm	1	5	1.1	0	0	0	0	0	
Starter voltage									
Six	87.8								
Twelve	11.5								
(24)	1								











comers. Perfection is little credit to the copier and much to the pioneer.

Whereas twin motors of the early designs had a regular labyrinth of accessories in the shape of bulky carbureters, fat intake manifolds, generators, magnetos and what not between the Vs, the present tendency is to clean out this space as much as possible. It is no longer a pocket into which accessories are dumped.

Overhead-valve construction is appearing in twin motors more than ever. One reason for this, of course, is that the designer of that motor believes this type to be superior. Another good reason, however, is that the valves are accessible as they cannot possibly be when placed in L-head fashion on the inside of the V. It is seldom now that one finds a V-motor in which the carbureter adjustments are down in what seems to be a bottomless pit to the man who is endeavoring to adjust the instrument. They are well up where they can be easily reached.

Casting intake and exhaust manifolds

into the cylinder blocks in all types of motors is having a great deal to do with cleaning up the exterior. This is nothing new, but is surely getting more following every year. The complicated appearing pipes which look as though they were put on the motors as an afterthought are rapidly disappearing. Let it not be understood, however, that a motor with outside manifolds is necessarily any less efficient than one with them cast integral. The adherents of exterior manifolds believe them to be efficient or they would not use them. Another item of cleanliness which is a matter of dirt rather than of distribution of parts, is in so choking or locating the crankcase breather that it will not spray a film of oil all over the hood interior. A particular meritorious disposition of the breather is found in the Dorris. The tube opens directly into the inclosed overhead-valve compartment, so that the oil vapor not only stays away from the motor exterior, but assists in lubrication of the overhead valves.

REMEDYING THAT TIRED FEELING

MUCH has been done in a number of ways to reduce the fatigue limit of the motor as a whole. Things which, in previous years, contributed to the short life of motor car engines were excessive weight of parts, very poorly balanced crankshafts, heavy pistons and connecting rods, and rough surfaces in the combustion chamber. Another big factor was the fact that, because of the youth of the industry, metallurgists had not developed alloys in metals to meet the particular requirements of each part in the motor.

This matter of alloy metals is one of the blind developments in the motor car industry. The general public hears of the tendencies toward streamline bodies, double cowl, aluminum pistons, smaller bore and stroke, etc., but this vast stride in the industries does not reach the ears of the populace because motor car engineers seem to think the ordinary man does not care whether his connecting rods have nickel in them or vanadium as long as they keep on going up and down. This is not the case. The motoring public is becoming educated in a surprising degree and they are beginning to ask for those specifications which, a year or two ago were considered deep.

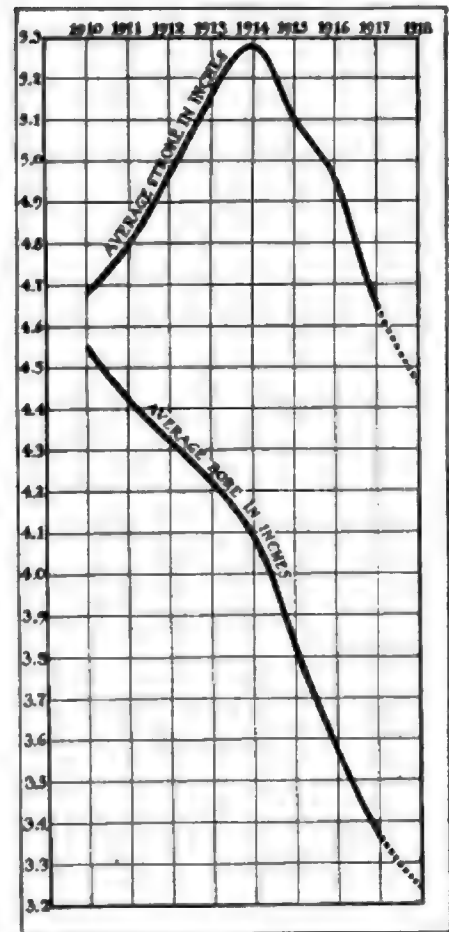
It is coming to the point now where every metal part in the motor car, no matter how small, must be constituted of a material treated after a prescribed formula which fits that particular part. This is a matter of percentages of the amount of carbon, nickel, manganese, silicon, sulphur, etc., and the heat treating process which involves a prescribed amount of heat, up

around 1500 deg. Fahrenheit, and a definite process of quenching, etc.

As has been previously stated the parts have figured in on a sweeping weight reduction. The strain on the bearings is surely a great deal less than it was in the days of cast connecting rods and stationary engine pistons.

A motor which does not vibrate is obviously going to have a much longer term of life than one which throbs and shakes itself to death from improper balance. There are very, very few manufacturers offering cars for 1917 delivery having motors which are not provided with some method of counterbalancing the reciprocating action of the pistons and connecting rods. Hudson was one of the pioneers in this principle and has brought out some surprising performances with its super-six motor.

A motor which carbons freely is not as



Bore and stroke curves are still descending. Our last year's bore prophecy exactly hit the mark. Will it hold true once more?

long-lived as one which remains clean. Another advantage of aluminum is that it has little affinity for carbon. Thus, aluminum pistons remain comparatively clean for a long period. Combustion chambers are being machined out to a smooth finish by many manufacturers and this slippery surface makes a poor resting place for the over-present black soot which oil and gasoline makers cannot eliminate.

Because of the rapid strides in the development of special machinery we are getting motors which are machined down to a much finer point than they used to be.

BUILDING UP PEP

ACCELERATION, the kind that makes the rear of the seat hit you in the back when you step on the throttle, is being demanded by car purchasers and consequently supplied by car manufacturers. This snap and vigor in the powerplant is brought about in a vast number of ways and contributing factors are found throughout the chassis from the front axle to the rear.

At first impression it might seem contrary to reason that a very much smaller motor than was built say four years ago can give a car of the same weight about twice the accelerating ability. The fact develops here that the small motor is capable of a thousand or maybe more revolutions in each minute and because of this it is quite possible to step down the gear-tratio. A car of four years ago with the old slow

speed plugger of a motor might be developing an r.p.m. of around 1000 and drive the car faster than the speed limit allowed, while the present-day motor, turning at the same speed would be giving the car a leisurely sight-seeing pace. It is this factor more than any other that is giving the car more pep, more get-up-and-get.

It is possibly varying from a motor story to discuss gear ratios, but the affinity of this factor with motor speed, makes a few figures permissible. In 1912 the average gear ratio on high was 3.62 to 1, in 1913 3.57 to 1, in 1914 3.6 to 1, in 1915 3.85 to 1, in 1916 4.08 to 1, and now in the new year we have an average of 4.15 to 1. Our motors are going faster and the flexibility

is stepping up, so that we have surprising power performance in such small motors.

Let's have another list of figures to show how the motors are growing smaller. This regards piston displacement: 316.2 in 1912, 345 in 1913, 349 in 1914, 307.38 in 1915, 278.87 in 1916 and 222.5 in 1917.

Of course a big contributing factor to rapid acceleration of the motor is lightness of reciprocating parts, which has been previously discussed. Another important item is that the amount of charge taken into the cylinder at each stroke is considerably more than it used to be. The actual way in which this has been accomplished is in the smoothing out of the intake passages, previously described.

BETTER ASSIMILATION

ECONOMY! Prices are going up. A man is paying more for his car, and for that very reason wants it to operate more economically to pay for the difference in price caused by the high cost of materials and labor. Gasoline is higher by double in a good many localities than it was a year and a half ago. Economy in a motor car means small gasoline consumption. The motor and its accessories should bear the responsibility.

It is very much easier to say what has not been done to give economical operation to the motor than what has been done, as there is practically no part which has not received consideration with this one idea in view.

If a certain quantity of gasoline could be delivered to the carburetor, converted into a mixture of air and gasoline vapor, passed through the manifold and valves and exploded in the motor without the loss of a speck of gasoline we would have a very nearly ideal motor. This end can probably never be reached, but it is a goal and the designers are using it as a guiding star.

The carburetor has much to do with it but by no means all. As previously mentioned the new instruments on the market are planned to give the correct proportionate mixture of gasoline vapor at all speeds. Be it known that the demands of a motor at varying speeds are greatly different as far as mixture is concerned. A sharp-cornerless manifold with a smooth interior helps to allow passage of the full charge to the motor. Large valves help to get it all into the cylinders, and valves located near the center of the combustion chamber help to distribute the gas rapidly and where it is needed, ready for the explosion. A hot spark serves to ignite that gas quickly and ample sized exhaust valves, properly located, give the gas a final shove and practically get it all out and into the muffler, although theoretically there

is some which does not find an exit.

The matter of small bore with proportionate large power brought about by the factors previously discussed, has its effect in motor economy. It is surely reasonable

PERFECT MOTOR PHYSIQUE

IN MEMORIAM to the low speed, overweighted, unbalanced, and unsightly motor of the past years which had the apparent complexity of a linotype machine and the sluggish action of the proverbial slow train through Arkansas.

The question is, what are we going to have? First of all we will have fours. Prophecies of bygone years that the four would practically leave our midst in favor of the purring twins has been dispelled. This is sharply brought out in the 1916 announcement of Buick's return to the four-cylinder fold. We will have sixes, eights and twelves. We will have Knight sleeve-valve motors. The Willys Knight is selling in large quantities and will continue to.

But the question is, what is to come? It might be assumed that we will have successful rotary valve motors. Heretofore this type has been taboo because the rotary valve could not be properly oiled, and there have been many other drawbacks. We may have successful two-cycle motors, in fact the writer of this article saw a two-cycle motor the other day which will idle down close to 100 r.p.m. and hit evenly on every cylinder. This has been the two-cycle drawback heretofore. Its flexibility in comparison with the number of cylinders is unquestioned.

The question of sixteen-valve construction is stirring up unusual interest because of its recent adoption by two big makers.

to assume that a smaller combustion chamber takes less gasoline. Condensation in the manifold is reduced by hot water or hot-air jacketing. All these factors have received diligent attention in the hands of the designers and contribute to make far more economical cars than we ever had before.

This has been a year of surprising interest in the subject of kerosene carburetion. MOTOR AGE receives many inquiries from its subscribers asking whether the motor car engineers are pure boneheads or if they are spending so much of their time on getting out cars to supply the demand that they are forgetting that the public wants a successful kerosene operating motor.

There has been a great deal done which the public knows nothing about. The day is coming when a low-grade fuel will be used successfully. There has been one big stumbling block in the way of this and that is the matter of heating this low-grade fuel so that it will vaporize. On par with this is the fact that it is hard to start a car in cold weather with gasoline as a fuel, and with a less volatile explosive the trouble is naturally much greater.

At any rate valves are going to be better located. Gases are going to be introduced into the cylinders at a point where they will be evenly and immediately distributed throughout the cylinder.

I was going to say that kerosene-burning motors may come. They are here. It will not be long before anyone who desires a Ford equipped with a kerosene carburetor may have one by specifying that it be so equipped at the factory or factory distributing station. Innumerable tractors are burning kerosene and are getting away with it in fine style. There is not a whole lot of difference in a tractor motor and a passenger car motor. It is a matter of speed of piston travel and weight of reciprocating parts more than anything else.

The bore and stroke are still on the downward slope as far as size are concerned. What are going to be the figures another year? A majority of the newest creations have motors of piston displacement in the neighborhood of 200 cu. in. In the curve showing the bore and stroke averages of a year ago the prophetic continuation of the bore curve for 1917 hit the mark almost exactly. In the stroke curve we did not step down far enough. Is it reasonable to suppose that the limit has been reached? It is a prophecy that another year will show one more general slash in the average size of piston displacement. There are going to be some remarkable developments in economy.

power is considerably below the par established a year ago, yet the product of the car factories has been enhanced in value by the additional research and experiment conducted in the twelve-month. When you sit behind the wheel of a 1917 model and begin your annual drive, you will find you have better value than you had in the beginning of 1916, even though you did have to dig down a little deeper into the bank account than you figured you would. When you discover that, perhaps the additional cost will not be a disturbing factor in your mind.

Looking back over the span of motordom, one fact stands out prominently. The present popular-priced car, and by that I mean those listing from \$900 to \$1500, if put in the scales of average with a car costing four or five times as much five or six years ago, the balance would almost invariably be in favor of the newer creation. The high-priced car of 1917 and the car of equal price half a decade ago have little in common. We have only to look at the \$5000 car, or one of higher price to-day to know why the price is that high and it can truthfully be said that the high-priced car of 1917 is correspondingly better in the same ratio that the present popular-priced vehicle bears toward the highest-priced car of five years ago.

More Cars Under \$1000

Even though you have been told that the average price of 1917 cars is higher than the average for 1916, there is no cause for alarm, and you who have hoarded your loose change with the idea in mind of sporting a new model during the early spring will have plenty of cars to choose from, in fact, there are more listing under the \$1000-mark than there were a year ago. For 1917 there are sixty-five models in four-cylinder cars and twelve six-cylinder models from which to make a choice. Last year there were only forty-nine fours and eleven sixes.

The lowest priced four is the Ford roadster, which held the low hand so far as price was concerned a year ago, yet this year the Ford is one of the few cars on which the price is lower, and this with a decided improvement in appearance. The Ford touring car and the Emerson four are the only others that list under \$400. Saxon and Chevrolet are the only two fours in the range from \$400 to \$500. Nine models of fours are found in the class from \$500 to \$600; eleven from \$600 to \$700; twelve from \$700 to \$800; nineteen from \$800 to \$900, and eight from \$900 to \$985. The lowest priced six is the Grant at \$825 and this same car with another body type heads the \$1000-list of sixes.

The loss in the number of four-cylinder chassis seems to be the gain of the sixes, since 37 per cent of all chassis models are four-cylinder as against 39 per cent in 1916, whereas the percentage of sixes for 1917 is 47, compared with 45.8 per cent in 1916. Eights have dropped off slightly

and twelves have nearly doubled, although for 1917 their percentage of the whole number of chassis is but 4. The highest-priced eight is the Cunningham, at \$5250, and the lowest, the Homer-Laughlin front-drive car, which lists at \$1250. Eger still can boast of the lowest-priced twelve at \$1295, although this represents a raise of \$200 since last year. The Austin Highway King is the highest-priced twelve, listing at \$5250, and it remains for the four-cylinder car to top the list for 1917 with a crown of \$9000, which is the tidy price asked for the F. R. P. 45 with Victoria top.

Getting down to some actual increases in prices and being specific: Dort raised its price \$30, Ross \$200, Chevrolet \$50 on the Baby Grand and 185 on the eight-cylinder touring, Daniels \$200, Chalmers \$70 on the seven-passenger touring, \$90 on the sedan, \$70 on the town car and limousine

FOURS AND SIXES UNDER \$1000

SIXES

Grant, K.	\$1,000
Monitor, O.	995
Monitor, M.	995
Chicago, 6-40.	985
Elgin.	985
Lambert, 80.	985
Grant.	960
Overland, 35.	925
Hollier, 186.	895
Oakland, 34.	875
Saxon, 8-4.	865
Grant, K.	825

FOURS

Car and Model	Price
Kent, A.	\$985
Maxwell, 25.	985
Monroe, M-4.	985
Monroe, M-3.	985
Empire, 45.	960
Dodge.	950
Studebaker, 4-40.	940
Studebaker, 4-40.	930
Inter-State, T.	895
Laurel, 35.	895
Hackett, 4.	888
Classic, 4-40.	885
Laurel, 35.	885
Bell, 17.	875
Reg. R.	875
Hatfield.	875
Maxwell, 25.	866
Orexel, R-30-35.	855
Allen, 37.	850
Inter-State, T.	850
Lambert, 90.	850
Laurel, 35.	850
Elcar, D.	845
Pullman, 424-32.	825
Briscoe, B A 24.	810
Chevrolet, F-2.	800
Chevrolet, F-5.	800
Crow-Eikhart, CE-35.	795
Dixie Flyer.	795
Monitor, C.	795
Monitor, R.	795
Napoleon, 30.	795
Overland, 85-4.	795
Dodge.	785
Princess, 4-36 F.	775
Ghent, 4-30.	750
Harvard, 4-2 T.	750
Richmond, 4-35.	750
Dort, 9.	695
Regal, 4-32.	745
Marbom, A.	695
Overland.	695
Partin-Palmer, 32.	695
Briscoe, B A 24.	685
Arbenz, D-4.	675
Buick, D-4-35.	675
Buick, D-4-34.	660
Crowther, 5-03.	650
Ford, T.	645
Monroe, M-3.	635
Ford, T.	595
Harroun, A-1.	595
Maxwell, 25.	595
Maxwell, 25.	580
Monroe, M-3.	565
Moore, 30.	550
Metz, 25.	545
Partin-Palmer, 20.	545
Ford, T.	505
Saxon, B-5 R.	495
Chevrolet, 4-90.	490
Crowther.	450
Emerson.	395
Ford, T.	380
Ford, T.	345

and \$100 on the 6-30; Pullman \$85, King \$50, Packard \$185 on the model 225 and \$235 on the model 235, Marmon 34 \$115, Kissel made increases in all models ranging from \$90 to \$115, McFarlan raised \$300, Winton \$200, Saxon \$50, Premier \$200 to \$215, Allen \$100 on all closed cars, Mitchell \$100, Cadillac \$160, Austin \$350 to \$600, Buick D 4-34 and D-4-35 \$10, D-6-44 \$55, D-6-45 \$50, D-6-46 \$15, D-6-47 \$35; Maxwell touring car and roadster \$40, Franklin \$100 on all models, Standard \$100 on all models, Auburn six \$60, King seven and four-passenger touring cars and roadster \$185 and seven-passenger sedan \$200, Paige 39 \$85, 51 \$120 and 39 \$105, Studebaker \$25 to \$30, Pathfinder touring \$275 and roadster \$425, Lozier \$100, Argo \$20, Hudson \$275, Velie \$50, Regal \$50, Oakland 34 \$30, Detroit \$100, Briscoe 4-24 \$60, Hal touring and roadster \$215, sedan \$60, Hal touring and roadster \$215, sedan, limousine and brougham \$250; Cameron \$165, Haynes \$100, Jeffery \$100, Peerless \$90 on all models, Abbott \$100 on all models, Stearns eight \$100 and four \$45, Cunningham \$250 on all models.

Sales Over a Billion

It might not be amiss to tell in a story of this kind just what the industry did in 1916 in the way of sales. The year just closed was a record one so far as sales were concerned, the progress attained being as great as that of any other American industry. Retail sales of motor cars in 1916 were in excess of \$1,000,000,000, and there is no indication that the demand for a reliable, service-giving, power-driven vehicle that has taken such an important place in the work of transporting rapidly and economically a big proportion of the citizens of this and other countries of the world, is nearing a decline.

Figures that are a veritable romance in business, and which show that the sales of last year exceeded 1,600,000 passenger and commercial vehicles, with a retail value of over a billion dollars, and an average price of approximately \$672, make interesting study. The average price for passenger vehicles, considering the total volume sold, was \$605, a little over one-third of the average price of each make of car produced.

It seems apparent that the real answer to the motor trade prosperity is the one magic word, "service." Just as long as the motor car can transport the individual or freight more rapidly and at a lower cost than any other type of vehicle, just so long will this country and the balance of the world scrape up its pennies and hoard them until they can buy some sort of a motor vehicle. There are types for the most fastidious—those who want all the luxuries of the king's equipage, or those who do not go in for pulchritude just as long as the particular vehicle their pocket-book lets them buy gets them to their destination on time and with a degree of comfort.

The Motor Follies of 1916

By J.C. Burton

Introducing a Coney Island ballyhoo. Also the author's alibi.

This is but an introduction
To a big twelve scene production
That is absolutely new
In the way of a revue.
Ziegfeld, who is known as Flo,
Neither backed nor staged this show,
Yet our all-star cast and chorus
Get a stipend that will floor us.
Buy seats early, take no chances,
Or you'll miss the songs and dances,
Wit and satire fired in volleys.
Make way for the Motor Follies.

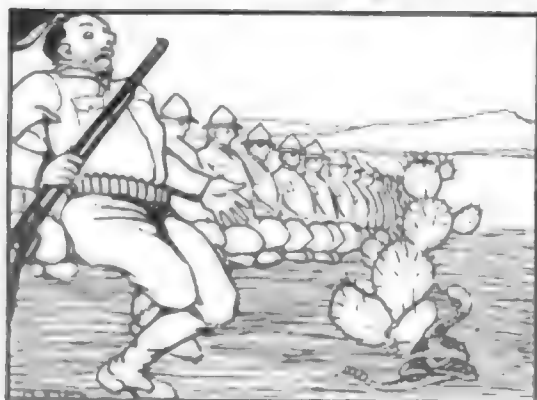


A court of bankruptcy. Short-measure gasoline tanks make merry in jury box as crowd of motorists, clothed in sack cloth and ashes, plead before Judge K. M. Landis.

Motorists— Hey diddle diddle,
The cat and the fiddle,
The cow jumped over the moon.
This doesn't compare
With the flight in the air
Of the gasoline prices' balloon.
John D. may give thanks,
But we've robbed our kids' banks
To purchase a pint of rare stuff;
We squandered our treasure,
Got less than full measure,
Our lot is exceedingly tough.

The Judge— Enough!

Motorists— Our lot is exceedingly tough.
We're at the mercy of the court
While cheating gas tanks gayly chort.

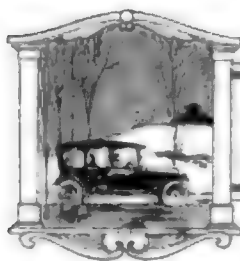


On the Mexican border. At rise of curtain, standing army is seen sitting down, watchfully waiting and too tired to fight. President Willsoon has just finished dictating a note to Switzerland, protesting against the use of Swiss submarines to blow holes in Swiss cheese, addresses the troops:

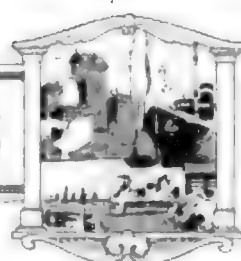
Call out the standing army and recruit the volunteers;
A foreign foe is in our midst and danger now appears.
Defense must be our watchword; it is time that we prepare
Or he'll carry off our currency and leave our pockets bare.
He has stormed eleven speedways, he has sacked them of their kale;

His Peugeot shows no mercy to the slow, the maimed, the frail.
He has broken racing records, he has broken into print.
If we don't watch out D. Resta sure will break the U. S. mint.





EDITORIAL PERSPECTIVES



The Motorist's New-Year Resolutions

- 1—I WILL read the Instruction books that come with my car.
- 2—I WILL examine my battery every other week and fill it with water if necessary.
- 3—I WILL test the inflation of my tires twice a week and keep them pumped up.
- 4—I WILL keep out of car tracks and frozen ruts.
- 5—I WILL examine the oil level in my crankcase before each trip.
- 6—I WILL use an anti-freeze in my radiator in cold weather.
- 7—I WILL have my car washed immediately after each muddy trip.
- 8—I WILL turn up grease cups and fill oil holes without waiting for squeaks.
- 9—I WILL not tinker with parts that I know nothing about.
- 10—My watchwords will be, "Safety First and Courtesy Always."

Included in Your Toast

THE clink of the glasses when the clock struck 12 and the figure six slid out of the calendar to make way for a numeral one unit greater, announced the end of the biggest year in motor car history and the birth of a new one possibly as big. It will be great in motor car production, but still greater in motor car perfection.

THERE is not a factory, outside of a very few who have operated on a constant, conservative policy for a number of years, that will not increase its production. It is naturally affecting part makers, foundries, drop-forge plants. The prosperity of the motor car business is unrivalled by any industry in the country, not excepting steel production so directly affected by enormous war orders.

THIS tremendous speeding up of production is having a marked effect on the makeup of the car. And here figures in one of those providential combinations which favor both builder and consumer. The motor car buyer wants simplicity. He wants an absence of parts where parts are not needed. He wants parts which need attention so located that he can get at them easily.

CONSIDER the manufacturer's side. He is working towards the same end and the balances are even. The more simple the car the more quickly it may be assembled. The more accessible the parts, the less trouble the assembler has in fitting those parts to the chassis under construction.

IN THESE days, when one man works 8 hours a day turning down on nut on the same part of each chassis which comes crawling toward him on an uncanny looking endless chain, it is quite desirable from a manufacturing standpoint that that nut be so located that the laborer can get it firmly seated before his allotted 15 sec. per chassis, or whatever it may be, has terminated.

WHEN the time comes that the owner of the car wants to remove that bolt, it is going to be just as easy for him to reached as it was for the assembler. Thus, we have accessibly located parts. We have instrument boards which carry all

wiring and are assembled with the chassis so that the body may be removed from the car without touching a wire. If the instrument board is not of this construction, the wiring is carried to a single fuse board on the dash which may be removed, permitting the removal of the body and dash without tangling up a lot of complicated wiring.

WE ARE finding oil cups placed on top. There is a marked improvement in the layout of twin powerplants. The space between the Vs is being cleaned out and the carburetor adjustment is being put within reach.

WHEN glancing over the chassis in the motor show make it a point to notice the little details of accessibility of parts. Note the location of the oil cups, the situations of various points of adjustment. You will find a number of little things that you have never read about and that the dealer has not told you about. There are little details in the makeup of every car which even the factory publicity departments do not consider worth mentioning, but they are there for a purpose and to favor the owner. Look for them.

HERE are a few of the places in which the designers are giving us a new and wonderful simplicity, intake and exhaust manifolds cast integral with the motor, simple starting motor drive replacing a cumbersome lot of clutches and levers, conduit electrical wiring and grouping of fuses and electrical instruments, a general wave toward Hotchkiss drive which eliminates torsion tubes and radius rods, frame extensions to constitute the running boards, use of frame cross members as locating places for brake-rod equipment and even as rear-seat heel boards.

EVEN the body design is exemplifying the trend toward simplicity. The lines are plain. Everything is smooth. The humped-up and ungainly cowl of a few years ago are gone. Radiators are simple with rounding tops. Some time back designers seemed to consider that radiators must express individuality and the result was an odd-looking assortment of shapes which were far from beautiful. Now there are a dozen radiators that one can hardly tell apart. It is the age of motor car simplicity and the owners may be thankful.

New York Curtain to Rise Saturday

Opening of Motor Show Is Expected to Reveal Greater Versatility Than Ever

NEW YORK, Jan. 2.—The stage is set, and next Saturday afternoon at 2 o'clock when the button is pressed that raises the curtain on the seventeenth national motor show in Grand Central Palace, it is a record-breaking program that will meet the eyes of spectators. Not only is the diversity of exhibits greater than ever, but a new year in production such as has never been equaled has put energy into the exhibits, which bid fair to attract a larger attendance than has visited the New York show any one year since motor shows became vogue.

Cars of every description and sort, from the smallest, costing less than \$400, to the most expensive limousines, priced in the neighborhood of \$10,000, have been rehearsed for the great event, and a chorus of accessories, supplies and parts embodies all that is latest and best in that art of interesting the car devotee. Practically everything from closed car bodies down to new-fangled cotter-pins are in the wings, awaiting the proper cues. In fact, the one and only accessory not displayed is that commodity gasoline, which is barred by the fire department.

400 Cars to Be Exhibited

No less than 400 complete cars will be on the stage at 2 o'clock Saturday, and during the next few days those delayed in transit will be added. Just how many hundred tons of parts and accessories will be seen it is difficult to estimate. As for the body characters who have part: Starting with the regular touring car for five or seven passengers, the roll includes the convertible touring car, roadster, coupelet, coupe, convertible coupe, clover-leaf, sedan, convertible sedan, open sedan, limousine, open limousine, Berline, brougham and landaulet. And if one be unable to distinguish between any and all of these characters the show will give ample opportunity for a liberal education in such knowledge.

Twelves, eights, sixes and fours will be represented in the engines among those present. Each type of motor has undergone more or less improvement during the 1916 rehearsals, and these should make the show that much more interesting.

The annual motor show given by the National Automobile Chamber of Commerce, Inc., has before this drawn attention to its large attendance, and this year promises even greater cause for attention. More than 250,000 persons attended the 1916 show. This year more special trains and excursions will be run to the show from distant cities than ever before in the industry, and there is consequently little rea-

son to doubt that the attendance records of last season will be changed materially.

As is the custom special acts have been arranged as the different acts to the show. Saturday, naturally, is Opening Day; Monday, Military Day; Tuesday, Pioneers' Day; Wednesday, Society Day; Thursday, Society of Automobile Engineers Day; Friday, Club and Association Day, and Saturday, Jan. 13, Closing Day.

Several organizations will meet between the acts of the show. The N. A. C. C. will have its annual banquet. The S. A. E. will hold its mid-winter meeting. The Motor & Accessory Manufacturers will hold its annual meeting. Various boards of these and other organizations will meet.

New members of the show are announced, and more interest is expected because the American six, Ben Hur, Bour-Davis, Doble steam, Dey electric, Drexel, Emerson, Harroun, Jordan, Kent, Pilgrim and Premier have been added to the already large cast.

FACTORY SERVICE AT HOME

Chicago, Dec. 30.—Car owners using Delco, Remy and Klaxon electrical equipment will get what practically amounts to

Price Increases

Detroit, Dec. 29.—The Oldsmobile Co. has increased prices \$100, to take effect Jan. 1.

MAXWELL PRICE INCREASE \$40

Detroit, Mich., Dec. 29.—Increase in the price of the Maxwell touring car and roadster to take effect Jan. 1 will be \$40 on each instead of \$135 for the touring car and \$120 for the roadster as announced in the December 21 issue of MOTOR AGE.

REO INCREASES PRICE

Lansing, Mich., Dec. 30.—The Reo Motor Car Co. has increased the Reo six-cylinder touring car and roadster models from \$1,150 to \$1,250. Other models are being continued at former prices but the company states that it will be unable to guarantee these prices throughout 1917.

TIRE COMPANIES RAISE PRICES

New York, Jan. 2.—Special telegram—Goodyear and Goodrich have raised tire prices 10 to 20 per cent. At present Fisk, U. S. Tire, Ajax and others are working on price readjustments and will announce changes in the near future. The Goodyear advance is 15 per cent on pneumatic tire casings and 10 per cent on pneumatic tubes and truck tires. The Goodrich price advances range up to 10 per cent.

factory service at home through the establishment of the Motors Service Co., 2641 South Michigan avenue, which is under the contract with the Dayton Engineering Laboratories, Dayton, Ohio, Remy Electric Co., Anderson, Ind., and the Lovell-McConnell Co., Newark, N. J., to render the same grade of service as the car owner would get direct from the factory. W. C. Bouleott, formerly assistant service manager for Delco, is at the head of the newly formed Motors Service Co., and L. C. Borel, former manager of the Remy branch here, is assistant service manager. The Remy branch has been discontinued to make room for the Motors Service Co., which started business Dec. 18.

RESIGNS FROM SCRIPPS-BOOTH

Detroit, Dec. 29.—W. I. Brown has resigned as sales manager for the Scripps-Booth Co. to join the staff of the Harroun Motors Corp.

CONSOLIDATED TIRE WINS

Chicago, Dec. 30.—Approximately \$400,000 in royalties and interest has been awarded to the Consolidated Tire Co., maker of the Kelly-Springfield tire, in its cases against the B. F. Goodrich Co. and the Republic Rubber Co., involving patent license infringement by the defendants. The proceedings involved the old Grant tire and its three patents of tire, channel and wire, and the decision was in confirmation of a report recommending a 5 per cent royalty by the master in chancery. In the case against the B. F. Goodrich Co., the royalties awarded amount to \$262,298.95; the Republic Rubber Co., \$114,064.65. These amounts, together with the interest, which will be between \$15,000 and \$20,000, bring the grand total of money involved near the \$400,000 mark. A similar case against the Diamond Tire Co. is yet to be decided.

HOTEL BUYS TAXICABS

Chicago, Jan. 1.—The La Salle Hotel of Chicago has the distinction of being the first hotel in the United States to operate its own taxicab service. Recently it closed a contract with the Willys-Overland Co., Toledo, Ohio, for fifty Willys Knight taxicabs and announced that the service would be inaugurated Jan. 1. Meanwhile the freight tie-up became worse, and it seemed improbable the new service could be installed. Dec. 29, however, seven taxicabs were shipped by express, and to-day, Jan. 1, these were put in service. The full quota will be shipped as soon as possible.



Sixty Million for Cars California Spends More Than \$1,000,000 a Week for Machines in 1916

Los Angeles Buys About 30 Per
Cent of Total

LOS ANGELES, Cal., Dec. 25—True to her best records in the motor car world, California by buying, at a conservative estimate, 33 1/3 per cent more cars in 1916 than in 1915, has more than exceeded the \$60,000,000 mark. Final registrations for the year are of course not all in, but the figures for the first 50 weeks results in this estimation.

At the close of 1915 Los Angeles county had 48,769 motor cars. Dec. 1, 1916, Los Angeles county had 64,193. Los Angeles had 35,282 of the 48,769 cars at the close of 1915. By the middle of this month Los Angeles had 42,316. Sixty per cent, in fact, of the new machines bought during the last year are accredited to southern California, and nearly half of those are accredited to Los Angeles.

January led in the number of sales. Final figures for December are expected to show this to be the poorest buying month. However, the announced increases in prices Jan. 1, 1917, has stimulated purchases at a time when the sales otherwise would have been much less. Prospective buyers customarily hold off during December, because they do not care to buy licenses that are good for a few days only.

BARTON HEADS NORTHWAY

Detroit, Dec. 30—Henry Barton has been made president of the Northway Motor & Mfg. Co. Mr. Barton has been an executive of the General Motors Co. for several years.

PACKARD'S FREIGHT ARRANGEMENT

Detroit, Dec. 29—The Packard Motor Car Co. has made special arrangements with custom officials of Canada to permit it to make shipments of Packard cars from Windsor, Ont., directly across the Detroit river from Detroit. The company has also rented twenty-six freight cars that are used in summer for carrying race horses. These cars are privately owned and are in consequence to be used only for Packard shipments and are returned to the factory as soon as they are unloaded.

SHOW TO BENEFIT ROADS

Milwaukee, Wis., Dec. 30—The opening day of the ninth annual Milwaukee show, Jan. 3 11, inclusive, has been dedicated to the cause of good roads, and the gross receipts Friday, Jan. 5, will be donated

by the Milwaukee Automobile Dealers, Inc., which conducts the exposition. A similar plan was followed at the second annual state fair show last September, when one day's receipts were turned over to the road association. The M. A. D. has designated each day of the show as follows: Friday, Good Roads; Saturday, Milwaukee Automobile Club; Sunday, Interurban; Monday, Merchants and Manufacturers; Tuesday, State Dealers; Wednesday, Milwaukee; Thursday, Grant Six day. On the closing day a Grant Six will be awarded.

TO PURCHASE BADGER BRASS

Detroit, Dec. 29—The C. M. Hall Lamp Co. has an option on the Badger Brass Co., of Kenosha, Wis., and will complete the purchase details shortly.

MANY CHANGES AT STUDEBAKER

Detroit, Dec. 29—Henry Kennedy of the foreign department of the Studebaker Corp., has been made branch manager at Omaha. L. A. Keller, formerly the Omaha branch manager, has been transferred to the branch at Portland, Ore., which was formerly managed by A. H. Brown, who has become a Studebaker dealer at Albany, N. Y. A. W. Crossman, who was formerly the retail manager in Detroit, has become the manager of the Los Angeles branch, position was vacated by the resignation of R. D. Maxwell, who has joined the organization of the Ables Co., Studebaker dealers at Honolulu.

BRANDENBURG SUES BUDA

Chicago, Jan. 2—Suit was filed here today in the circuit court of Cook county by Brandenburg & Co., Chicago, New York and Detroit, against the Buda Co., Harvey, Ill., alleging breach of contract and asking for damages of \$250,000 and an accounting according to terms of sales contract. Brandenburg & Co. state that in the summer of 1911 a contract was entered into with the Buda Co. by which Brandenburg became the sole organization for the Buda company for a term of years which Brandenburg & Co. state might be terminated by mutual consent July 1, 1917.

The Buda Co. holds that according to the contract the latter could be terminated July 1, 1916, and undertook through a written notice so to terminate the contract July 1, 1916. Brandenburg & Co. state that they have tried to carry out their agreements with the Buda Co., but that the Buda Co. since about July 15, 1916, has persistently refused to recognize Brandenburg & Co. as its sales representative. Brandenburg no longer represented Buda. Brandenburg & Co. further allege that they have sustained damages on account of the alleged breach of contract, and they allege that the Buda Co. notified customers that Brandenburg no longer represented Buda.

Bankers Believe in Cars But the Money Merchants Also Think Thrift Should Be

Made Guide

Wisconsin Motorists Are Advised to
Heed Economies

MILWAUKEE, Wis., Dec. 30—A decided change of heart in the attitude of Wisconsin bankers toward the motor car industry in one year's time is indicated by the trend of thrift propaganda undertaken by the Wisconsin Bankers' Association. Whereas as late as a year ago country bankers viewed with considerable concern the enormous increase in the number of cars in Wisconsin, they are at this time not only accepting the new order of things, but actually argue in favor of it.

The publicity department of the Wisconsin Bankers' Association in its most recent bulletin, published generally in the daily and weekly papers of the state, speaks as follows:

"Have a car if you can afford it, and not because your neighbor has one; get all the pleasure out of it possible, but remember 'Thrift'—those little economies in oil, tires, gas, electricity and the like. There will come a time, if it is not already here, when every man who earns \$1,200 a year in small places and \$1,800 a year in the larger towns can afford and should have a car. It brings more lasting and beneficial pleasures than any other medium yet devised as a pastime. It takes you out of doors. It gives you a chance to picnic with the family, see the country, save time, entertain as no other device ever can, and has its proper place in the scheme of life. But a little study of cars and their care and operation, thought for the little savings that are possible, will make what would seem to be a burdensome tax a real and lasting benefit.

"If, out of the millions of car owners of this country, only a small percentage were to practice thrift in the use of gasoline, the consumption would be greatly reduced and the cost cheapened accordingly; for the high prices must of necessity be traceable to the huge and insatiable demand that results from hundreds of thousands of cars used daily."

WANT CONVICTS FOR ROADS

Kansas City, Mo., Dec. 29—The Kansas City Motor Car Dealers' Association, through its legislative committee, has completed arrangements for cooperating with the St. Louis Dealers' and Manufacturers' Association in an effort to secure the enactment of a law at the approaching session of the Missouri Legislature providing for the use of convict labor on the state highways. Local motor car dealers, as well as others throughout the state, believe that to the Wisconsin Good Roads Association

the money paid by car owners for their state license should be expended in a manner that will be of direct benefit to them. Hard surfaced highways are regarded by dealers and car owners as being a matter of foremost importance and so they propose that the money paid in car taxes be expended in a manner that will give the whole state of Missouri a well planned system of roads of this type. Under the present method the funds available are expended on dirt roads, many of them located in remote and little traveled parts of the state with the result that Missouri is regarded as one of the most backward states in the union in the matter of permanently improved highways.

ST. LOUISANS GET TAGS

St. Louis, Mo., Jan. 1—There was the usual scramble last Tuesday for favorite numbers when the 1917 city motor car tags were put on sale. Nos. 1 and 23 were the most popular, but No. 13 was neglected. For years it was a favorite. The tags are round, 2½ in. in diameter and have white characters on a blue ground. The cost ranges from \$2 to \$12 according to the power of the machine. These tags are apart from the state tags.

SENECA FOUR ANNOUNCED

Fostoria, O., Dec. 29—The Seneca Motor Car Co. will start production soon on a four-cylinder, five-passenger car selling for \$735. It will have an L-head Le Roi motor giving 27 h.p. at 2200 r.p.m., disk clutch and three-speed gearbox in unit. Cooling is by thermosiphon, the carburetor is a Zenith and the electric equipment consists of a Remy distributor, Willard storage battery and Allis-Chalmers starting and lighting system. Tires are 30 by 3½ with demountable rims and non-skid tires in the rear are standard. The wheelbase is 118 in. A three-passenger roadster will also be manufactured.

STATE FLOWER NAMES CAR

Los Angeles, Cal., Dec. 25—The car which is to be built by the newly organized Eisenhuth Motor Co. has been named the Poppy car in honor of the state flower of California. The company has been organized with a capital of \$10,000,000 and will erect a plant at Los Angeles Harbor. Construction will begin during January.

The Poppy car will be a five-cylinder machine of new design, distinctive and unique, according to its sponsors. The motor is to be self-starting. No transmission will be used, and a secret and exclusive system of reverse is to be featured. By use of a new gear invention the drive will be direct. It is claimed that various manipulations will eliminate 1202 parts of the present standard car. The engine is to have seventy-nine parts against the customary more than 200 in a four-cylinder type. The car is to sell for \$650 at the factory. It will have a wheelbase of 120 in. and accommodate four passengers.

Car Tax for U. S. Funds?

Congress May Make Levy On Vehicles to Meet Deficit in Federal Revenue

Will Be On Basis of Wholesale Price of Various Makes of Machines

DETROIT, Dec. 29—Reports from Washington state that Congress will again consider motor car tax as a method of increasing the government revenue. The plans to be suggested will include a tax of \$12 for motor cars wholesaling for less than \$500, \$18 for cars wholesaling at less than \$1,000 but more than \$500, \$20 for cars wholesaling between \$1,000 and \$2,500, and \$25 for all cars bringing more than \$2,500.

BAN ON IMPORTS TO INDIA

New York, Dec. 29—The importation of motor cars into India has been prohibited by government order, according to cable dispatches received by Dodge & Seymour, Ltd., export merchants of this city, handling the Ford and Hudson in British India and the Orient. According to the ruling no shipment will be permitted to enter India which has left the United States after Jan. 1, 1917.

MOUND CITY SAFETY BUREAU

St. Louis, Mo., Jan. 1—A bureau of public safety will be opened in the police headquarters or city hall this week under the general supervision of Director of Streets Talbot. The plan will be to educate people in safety-first measures. Complaints against reckless driving will be investigated and the offenders summoned to the bureau before court prosecution is tried. The motor car situation will be made a special study. The last police figures given out are that 65 persons had been killed by motor cars in the city from Jan. 1 to Nov. 1, 1916.

SEISS CO. BUYS PLANT

Toledo, Ohio, Dec. 29—The Seiss Mfg. Co., this city, has bought a factory with 52,000 sq. ft. of floor space. The purchase makes possible a triple expansion. Operation in the new plant will start about Feb. 1.

\$34,500,000 FOR ARMY TRUCKS

Washington, D. C., Dec. 30—Reports from the War Department show that about \$34,500,000 has been spent in the purchase and operation of army motor trucks this year. The last army bill appropriated \$23,000,000 for the present fiscal year, and an estimate of a deficiency appropriation of \$11,115,779 has been submitted.

Many of these trucks were in use on the Mexican border. Some of them now are stored at Fort Sam Houston, Fort Bliss

and El Paso, Texas, where they are available for future use. About 2300 trucks were bought for use on the border and in Mexico.

MONITOR COMPANY EXPANDS

Columbus, Ohio, Dec. 29—Arrangements have been made by the Monitor Motor Car Co. of this city to produce 3000 cars during the coming year, and its plant is being enlarged and equipped with that end in view. The company started 4 years ago as the Cummins-Monitor Motor Co., and each year has increased the number of cars turned out.

ONE WAY TO DO IT

Indianapolis, Ind., Dec. 30—The Premier Motor Corp. can claim credit for obtaining the long-wished street cars to carry their employees to and from the factory. Just before Christmas the company got tired of asking for these street cars and not getting them, so it ran a full-page newspaper advertisement to tell the public about it. Twelve hours of advertising did the work. They got the street cars.

MOORE GOES TO EUROPE

New York, Jan. 2—Bob Moore, racing driver, sailed for Europe Dec. 23. He represents a man in Texas, his home state, who is sending him to Europe to look over the racing car situation and to pick up two or more cars of first-class quality if they can be obtained.

HUPP TRAVELING NORTH

Detroit, Dec. 29—The Hupmobile capital-to-capital car, having completed the four capital corners of the United States, is now traveling north through the Southern Coast states to Washington. At present the car is between Atlanta and Nashville.

BUICK PROTESTS CAR ORDER

Flint, Mich., Dec. 29—William H. McLeod appeared before the interstate commerce commission at Washington, D. C., and protested against the issue of an order requiring the Buick Motor Co. to return to the owning roads within thirty days, all cars in the possession of other roads. He stated that such an order would produce a confusion that would force many of the factories to close because of the sudden withdrawal of cars on which the movement of the output is dependent.

BLAMES DEALER ALLOTMENTS

Detroit, Dec. 29—R. C. Ruesshaw, sales manager for the Reo Motor Car Co., has issued a statement in which he attributes the freight car congestion, in great part, to the shipment of cars on dealers' allotment schedules. He states that frequently dealers are unable to make the payments for these cars which are consequently held in the freight cars, thus keeping them from being emptied.

Astor Salon Shows Fifteen Makes

Thirteenth Annual Exhibition Opens with Eleven Made-in-America Brands on Display

NEW YORK, Jan. 2—Special telegram —The use of semi-dull finished bodies, upholstery devoid of the usual tufting and minute attention to detail constitute the principal features of the thirteenth annual salon which opened today at the Hotel Astor. The number of American cars is greater this year than ever before, and the work of American body-builders is far more representative. Fifteen different makes of cars are displayed, and eleven of them are American.

The show is essentially an exhibition of the latest in body designs. It is also a forecast of body fashions. In addition, several cars new to the American market are revealed to the public for the first time. These are the Biddle, Daniels, Murray, Phianna and Novara.

The Novara is the newest of these and is built in the plant of the Herreshoff Mfg. Co., Bristol, R. I., for G. M. Thurber of the Isotta Fraschini Motors Co., New York, and Sidney De Wolfe Herreshoff, who will market it. The car is small and is a speed creation supplied only with a mahogany roadster body, the price being \$2,750. It is equipped with a block, 3 by 4½ overhead valve, high speed four-cylinder motor with drilled Lynite pistons and drilled connecting rods. Speed capabilities are over 50 m.p.h. on second speed and over 70 m.p.h. on high. The weight is 1500 lb.; the wheelbase 110 in.; and the tires 31 by 4. The body is built of mahogany laid in the same manner as a yacht hull, with a one-piece unbound windshield. Rolled fenders hug the wheels tightly, and absence of the usual skirt to the body gives a distinctive touch. The car will be built only to order.

Semi-Dull Finish Is Preferred

A semi-dull finish is preferred by many of the exhibitors. It is said that those who will purchase these high-class, high-priced cars have taken a pronounced liking to the unobtrusiveness of this finish. Tufting has disappeared from the upholstery in a great many cases, this being particularly noticeable in the outside seats of the enclosed cars for the most part. Sombre colors are chosen for the inside upholstery, and several jobs are done in tapestry.

One of the features of these custom bodies is the great attention given detail. Neatness appears to be the paramount thought in the minds of the designers. The binding on windshields is getting smaller; body molding is getting smaller, and in some cases is disappearing. It is these little things which have such a big

effect in giving the custom body its air of exclusiveness. Darker colors are coming more into use.

Among the extreme body styles there is a Lancia hydroplane, a sporty type of roadster devoid of top or windshield and finished entirely in dark maroon. The cowl is the highest part of the body, the lines sloping back to a rear deck.

Both Locomobile and White have comprehensive exhibits, including nearly every type of body. In the Locomobiles, an innovation is equipment with dictaphones. One body is a sporting cabriolet in which the closed portion of the body entirely disappears. The usual side lamps are set into the windshield, leaving the exterior of the body entirely unobstructed. Another is a special boat type in which the top body line breaks sharply at the cowl and is continued straight back to a commodious rear deck. Seats are adjustable. A feature of the Locomobiles is the use of accelerator pedals the full length of the foot and shaped like the sole of a shoe. One Locomobile has the top body line beveled instead of fitted with the usual molding.

The pointed-front closed car is a popular style, White and Locomobile and others showing these. In them the body lines are perpendicular at the side. White has two pointed-front coupes, both finished semi-dull. These, with the other Whites, are equipped with the new sixteen-valve four-cylinder motor. Another White model is a boat type cloverleaf roadster with a slanting, pointed windshield and a beveled top body line. One noticeable feature of all these custom bodies is the trim manner in which fenders hug the wheels.

Daniels has an unusual type of White touring car fitted with a black Victoria top and equipped with a windshield at the back of the front seats, which slides up or down in the same manner as the windows in a limousine. A small crank operates it, and the supports fold to close the slot when the shield is down. This body has full mahogany molding.

CORBITT COMPANY RECAPITALIZES

Henderson, N. C., Dec. 29—Through the organization of the Corbitt Motor Truck Co. with a \$1,000,000 capital the Corbitt Automobile Co., which started to make motor cars seven years ago but after three years changed to motor trucks, announces the expansion of its territory and an increased schedule of 1200 or 1500 trucks a year. The company makes a line of

trucks ranging from three-quarters to five tons in capacity, all worm-driven. One reason for the reorganization is that, since the company has discontinued the manufacture of motor cars altogether, it was thought best to change the name.

RACINE RUBBER PURCHASE RATIFIED

New York, Dec. 29—The stockholders of the Ajax Rubber Co. have ratified the purchase of the Racine Rubber Co., Racine, Wis., and authorized an increase of \$10,000 in capital. The formal closing of the purchase will be consummated as soon as the reports of the accountants and appraisers are completed and the figures have been verified.

NEW MERGER MADE

Buchanan, Mich., Dec. 29—The Celfor Tool Co. and the Buchanan Electric Steel Co., this city, have merged as the Clark Mfg. Co., which was organized for this purpose. The manufacturing and selling methods of the two companies will be unchanged, and the personnel of the organization will be the same. The new company is capitalized at \$2,000,000 preferred and \$3,000,000 common.

S. A. E. PROGRAM FULL

New York, Dec. 30—Members of the Society of Automobile Engineers will have a busy time of it next week, since their annual meeting is scheduled to take place during show week. Jan. 9 and 10 various divisions will meet, and Jan. 11 papers will be delivered at a professional session.

Among the speakers are Capt. V. E. Clark, who will use army experience in operating aeroplanes on the Mexican border as a basis for suggesting changes in design necessary for obtaining a successful military aeroplane; H. L. Horning, who will consider the tractor engine; F. Hyman, who will read a paper on dynamic balance and the types of machines that do such work. N. V. Akimoff will offer a paper on "Dynamics of the Automobile;" A. P. Milbrath, "Some Essential Features of High-Speed Engines;" W. T. Sinleigh and W. E. Lay, "Heat Balance Tests of Automobile Engines," and E. A. Sperry, "Aerial Navigation Over Water."

John Barrett, director-general of the Pan American Union, will speak at the banquet to be held at the Biltmore Jan. 11 on "Pan American Commerce: Our Opportunity." More than 700 reservations have been made for the banquet already. The meeting will end with entertainment at Ziegfeld's Midnight Frolic.

Buyers' Guide to Car Body Types

ON this and the following page is given a Buyers' Guide to various body types of American motor cars which are not illustrated in the succeeding pages. In the section following these two pages are illustrated representative types of 1917 cars classified as to body style and below the illustrations are given in alphabetical form, the names and models, prices and some major dimensions of the cars illustrated on each page.

The table on this page and the opposite one presents the same information on additional body types to those which are illustrated. These two pages, together with information at the bottom of the illustrated pages, form a complete Buyers' Guide in which every body style produced by every American manufacturer for 1917 is listed. For quicker reference to the illustrated section, an index to this section is given herewith:

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FOUR-PASSENGER TOURING CARS

NAME AND MODEL	PRICE	CYL.	H. P.	W. B.	TIRES
Cadillac 55, Phaeton.....	\$2080	8	31.25	125	30x4 1/2
Charter Oak A.....		6	38.40	136	35x5
McFarlan Six, 124.....	3850	6	48.00	130	35x5
Overton Six.....	2500	6	33.75	132	34x4 1/2
Pierce-Arrow 48.....	4000	6	48.00	142	37x5
Pierce-Arrow 38.....	4000	6	38.40	134	36x4 1/2
Pierce-Arrow 60.....	5000	6	60.00	147 1/2	38x5 1/2
Singer, 11.....	3500	6	38.40	136	35x5

FIVE-PASSENGER TOURING CARS

NAME AND MODEL	PRICE	CYL.	H. P.	W. B.	TIRES
Aland, 14-60.....	\$1500	4	14.40	122	33x4
Ans. Sterling, 1917.....		4	15.93	110	30x3 1/2
Anderson, 6-40, 2000.....	1250	6	25.35	120	33x4
Auburn, 6-39.....	1085	6	23.44	120	34x4
Bell, 17.....	875	4	10.00	112	31x4
Biddle, D.....	2050	4	20.50	120	30x4
Cameron, 1917.....	1250	6	21.60	122	35x4
Davis Six, Roadster.....	1195	6	25.35	118	34x4
Davis Six, Roadster.....	1405	6	26.40	124	34x4 1/2
Emerson Four.....	395	4	22.50	110	30x3 1/2
Franklin, Series 9.....	1850	6	25.35	115	32x4
Howard, 1917.....	1250	6	25.35	118	32x4
Madison, 5, Standard Touring.....	1050	6	23.44	115	34x4
Madison, 5, Deluxe Touring.....	1150	6	23.44	115	34x4
Madison, 7, Standard Touring.....	1150	6	23.44	124	34x4
Madison, 7, Deluxe Touring.....	1250	6	23.44	124	34x4
Maltese, A.....	3000	8	33.80	135	35x5
Maltese, M.....	1200	8	33.80	135	35x5
Mignon, 34.....	3050	6	35.75	136	34x4 1/2
Moline-Knight, MK40, Mod. C.....	1450	4	22.50	118	34x4
Reo, R.....	875	4	24.23	115	34x4
Richmond, 4-35.....	1500	4	25.00	110	34x4
Stearns, S K L 4—Series 32.....	1450	4	22.50	119	34x4

SIX-PASSENGER TOURING CARS

NAME AND MODEL	PRICE	CYL.	H. P.	W. B.	TIRES
Anderson, 260 A.....	\$1250	6	25.35	120	33x4
Austin Highway King.....	3550	12	39.68	142 1/2	34x4 1/2
Charter Oak, A.....		6	35.42	136	36x5
Lucasville 38, R 4.....	4000	6	43.35	139	37x5
Lucasville 48, M 4.....	5400	6	48.00	142	37x5

SEVEN-PASSENGER TOURING CARS

NAME AND MODEL	PRICE	CYL.	H. P.	W. B.	TIRES
Austin Highway King.....	\$3750	12	39.68	142 1/2	34x4 1/2
Drexel.....	1485	4	10.00	118	34x4
Flat, 55 E 17.....	5500	4	42.03	140	35x5
Hupmobile, N U.....	1340	4	22.50	114	35x4 1/2

NAME AND MODEL	PRICE	CYL.	H. P.	W. B.	TIRES
Laurel, 35.....	885	4	22.50	112	33x4
Lexington, 6-P.....	2875	6	40.84	144	36x4 1/2
Maltese, A.....	3000	8	33.80	135	35x5
Maltese, M.....	1200	8	33.80	135	35x5
Peterson, 6-45.....	1695	6	25.35	117	32x4
Philana, M (Chassis only).....	3000	4	24.70	112	32x4 1/2
Richmond, 6-17, Special.....		6	23.40	124	36x4 1/2
Sun Light Six, 17.....	1145	6	23.44	116	34x4
Whips Six, 88 H.....	1325	6	23.40	125	35x4 1/2
Whips Knight, 88 C.....	1285	4	24.22	121	34x4 1/2

TWO-PASSENGER ROADSTERS

NAME AND MODEL	PRICE	CYL.	H. P.	W. B.	TIRES
Abbott, 6-44.....	\$1195	6	25.35	122	32x4
Aland, 14-60.....	1500	4	14.40	122	33x4
Ans. Sterling.....		4	15.93	110	30x3 1/2
Auburn, 6-39.....	1085	6	23.44	120	34x4
Biddle, D.....	2050	4	20.50	122	30x4
Briscoe, B.....	985	4	15.20	105	30x3 1/2
Brunswick.....		4	30.10	120	32x4 1/2
Cadillac, 55.....	2080	8	31.25	125	36x4 1/2
Cameron.....	1250	6	21.60	122	35x4
Chevrolet, 400.....	490	4	21.75	102	30x3 1/2
Chevrolet, F2.....	800	4	21.75	112	32x4 1/2
Chicago, 6-40, Patriot.....	985	6	23.44	120	32x4
Chicago, 6-40, White Cap.....	985	6	23.44	120	32x4
Cunningham, V.....	3750	8	45.00	130	35x5
Drexel, R-30-35.....	855	4	10.00	112	30x4
Eber.....	845	4	10.00	115	32x3 1/2
Empire, 45, Speedster.....		4	24.03	116	36x4
F. R. P. 45 (Chassis only).....	7000	4	33.80	140	36x5
Franklin, Series B.....	1800	6	25.35	115	32x4
Genova, Speedster.....	2500	6	38.40	139	34x4 1/2
Hal Twelve, 21 A.....	2385	12	39.68	135	34x4 1/2
Harvard, F-21.....	150	4	13.40	100	28x3
Ind. State, T.....	850	4	10.00	110	30x4
Jackson, Wolverine.....	1295	8	28.80	118	34x4
Jettix Six.....	1435	6	29.40	125	34x4
Jordan, Sixty.....	1650	6	29.40	127	35x4 1/2
Kearney, 6-38.....	1175	6	25.35	120	34x4
McFarlan Six Touring.....	3700	6	48.60	148	36x5
Mitchell, D-40.....	1150	6	25.35	120	32x4
Monitor, R.....	795	4	22.50	108	32x3 1/2
Monitor, D.....	905	6	25.35	115	36x4
Monroe, M 3, Cloverleaf.....	955	4	14.40	98	30x3
Olinmobile, 40.....	1295	8	26.45	120	36x4
Pierce-Arrow, 48.....	4300	6	48.00	142	37x5
Pierce-Arrow, 38.....	4000	6	38.40	134	36x4 1/2
Primrose, 4-35, L, Speedster.....	175	4	22.50	108	32x3 1/2
Singer, T.....	3500	6	38.40	136	35x5
Tenager.....	1225	4	38.40	120	32x4







































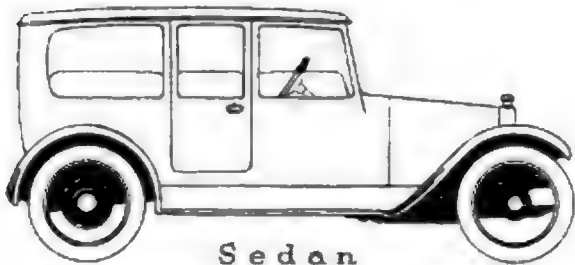




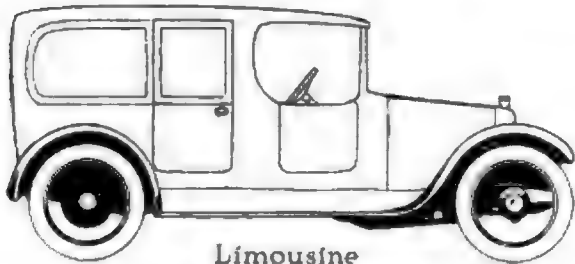
Closed Car Styles



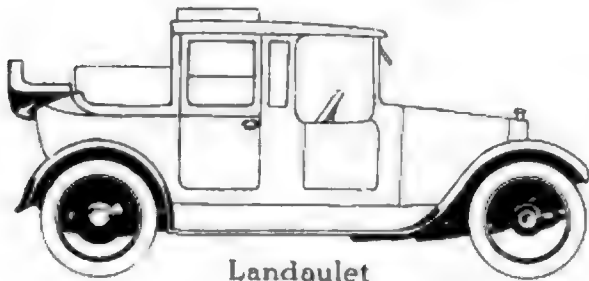
Berline



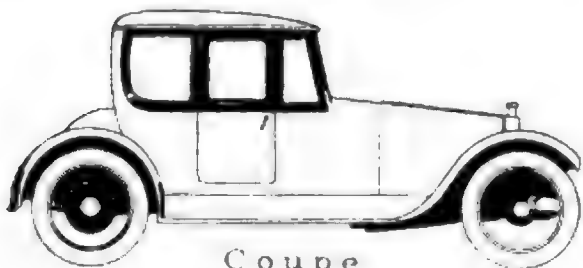
Sedan



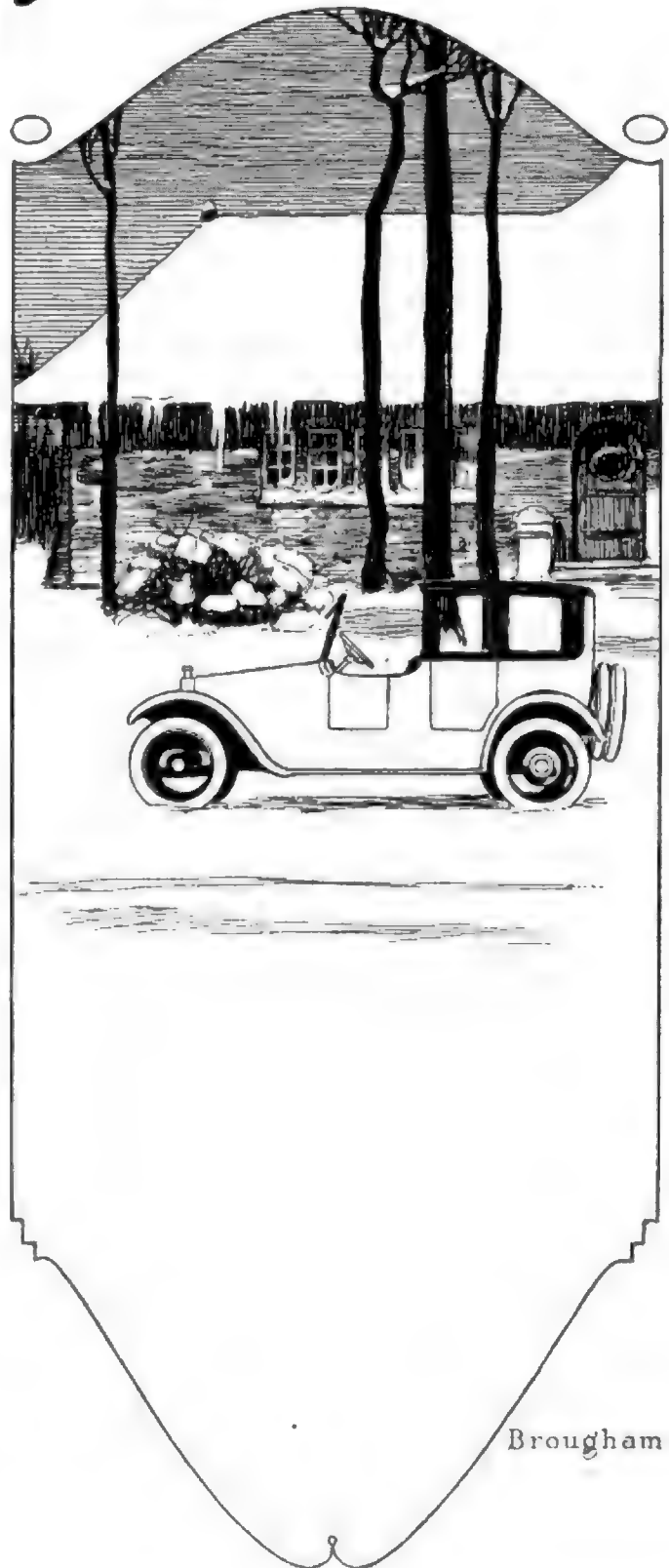
Limousine



Landaulet



Coupe



Brougham







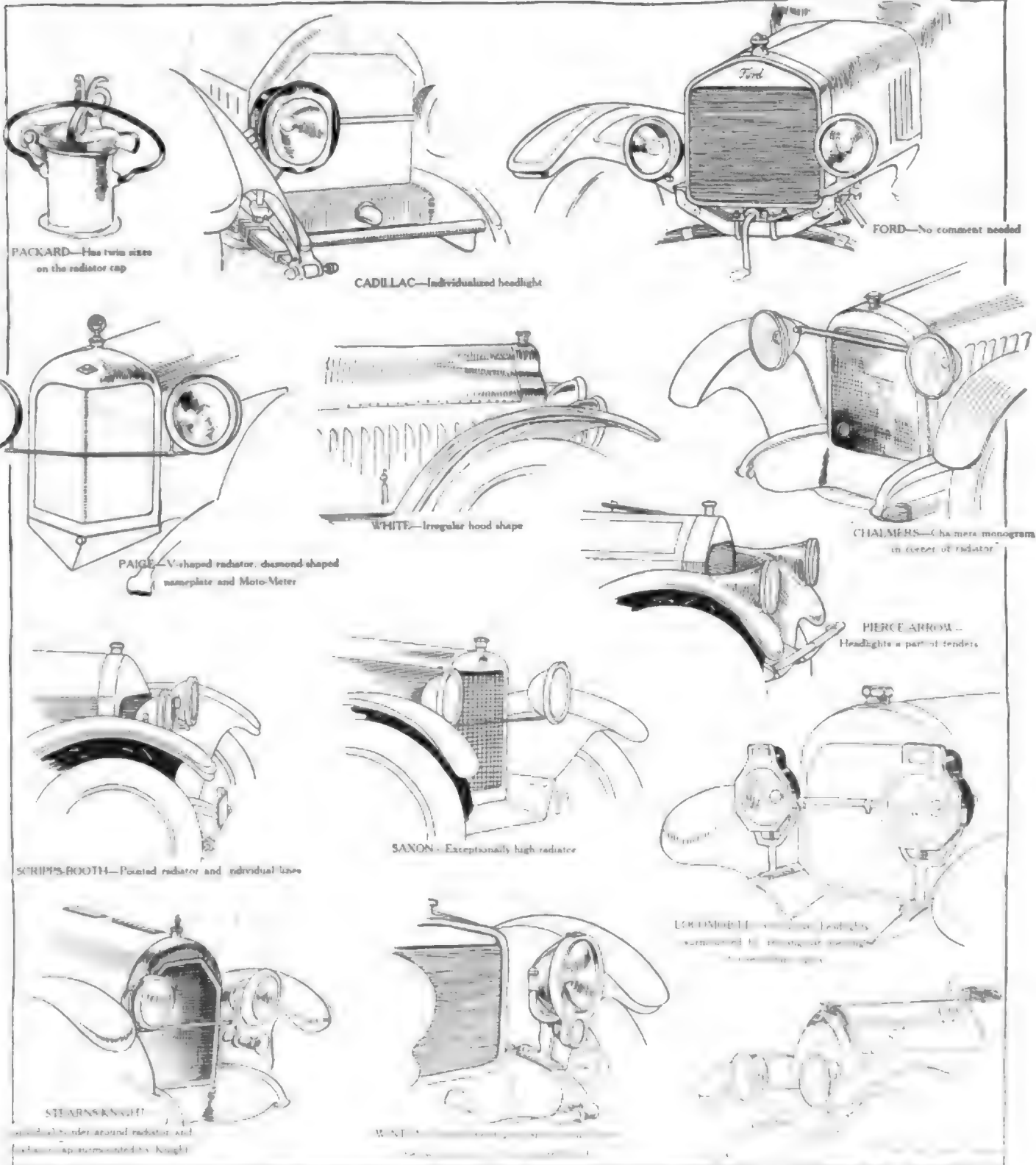


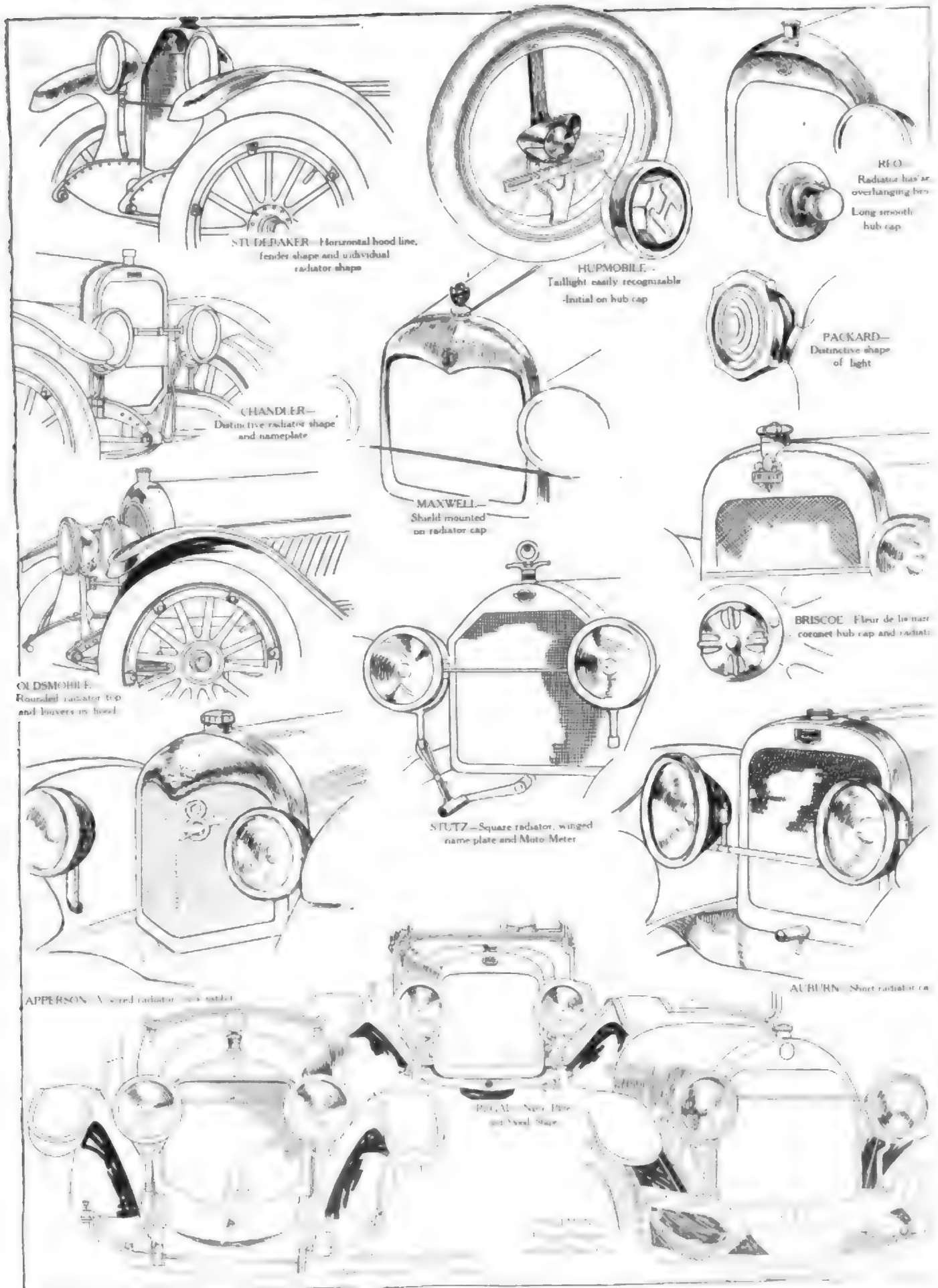


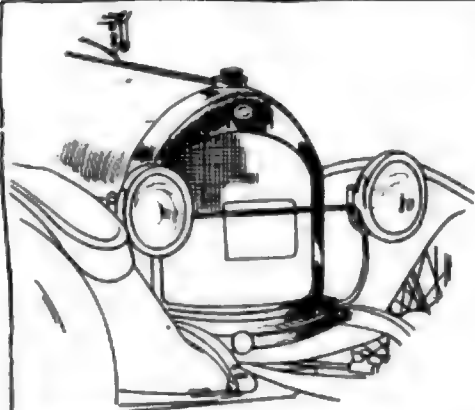


Car Personalities

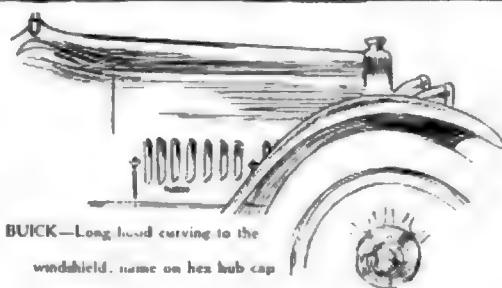
Individualities by which 1917 Cars
Can be Readily Recognized



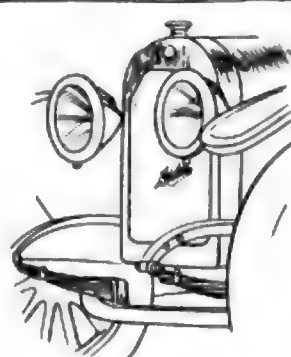




OVERLAND—Hood contour radiator cap lock



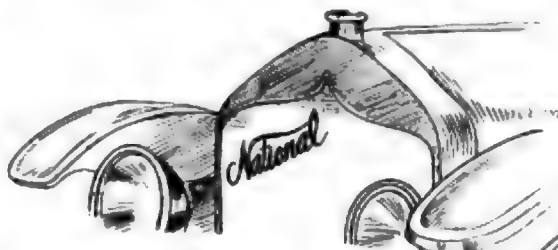
BUICK—Long hood curving to the windshield, name on hex hub cap



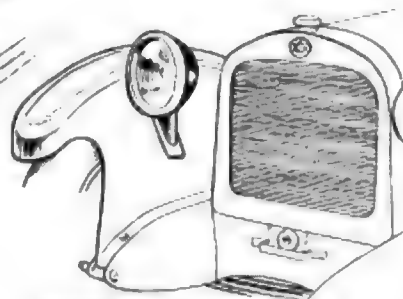
MITCHELL—Script name on radiator



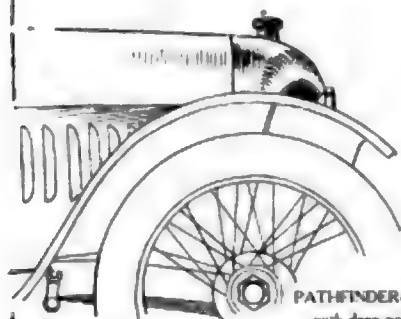
KING—Radiator same shape as nameplate shield



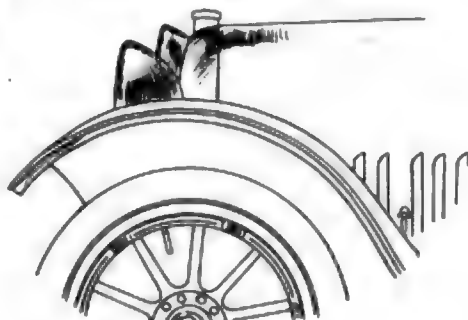
NATIONAL—Inverted-shield radiator shape; name in script across radiator



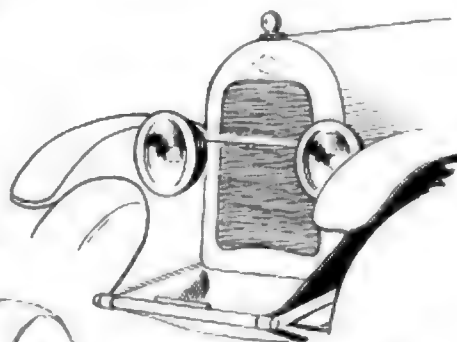
DODGE—Highly crowned fenders, six-pointed star with monogram



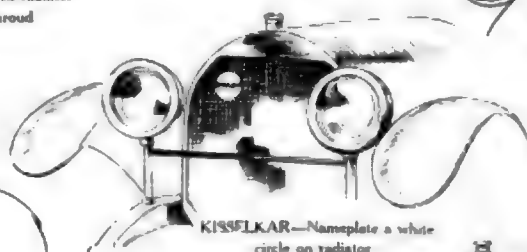
PATHFINDER—Pointed radiator with deep pointed shroud



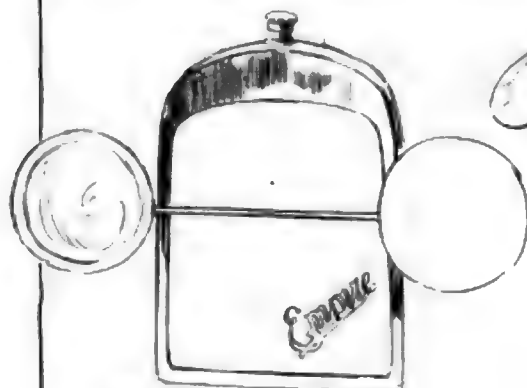
VELIE—Radiator hood line and lamp



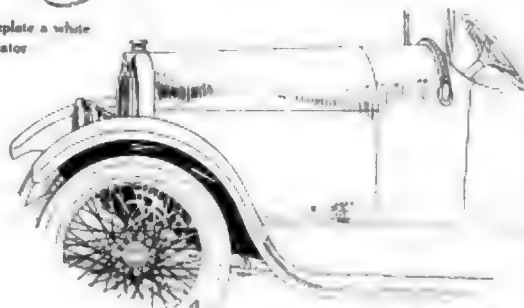
MONROE—With diamond-shaped nameplate



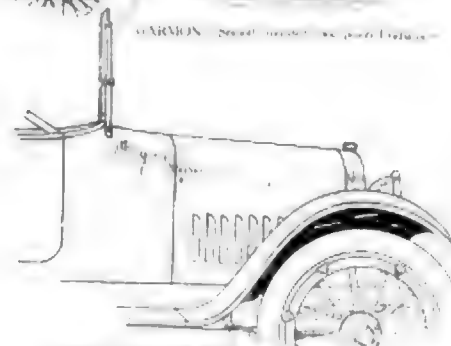
KISSEL—Nameplate a white circle on radiator



EMPIRE—Displays its name on the radiator



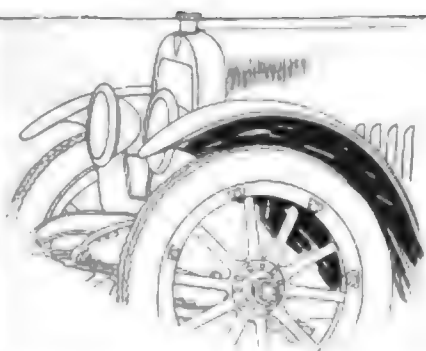
MARION—Small radiator, nameplate



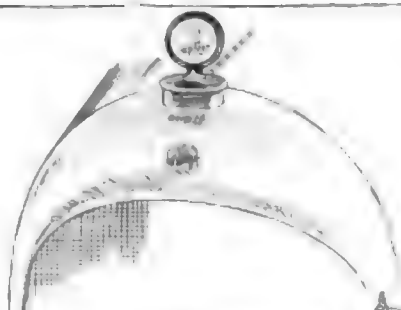
MERCER—Name plate, a shield on filler cap and Moto-Meter



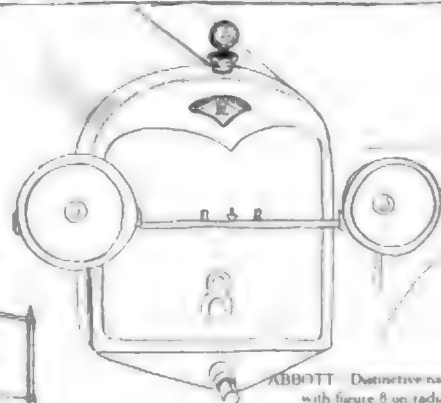
MOON—Crescent on filler cap



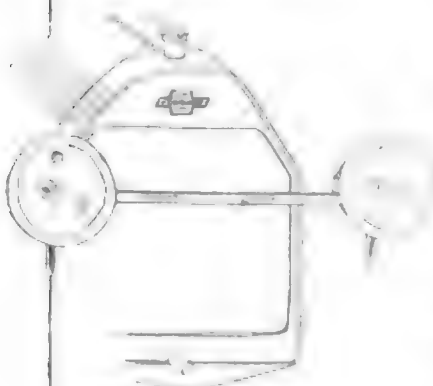
HUDSON Triangle on the radiator and headlights



WILLYS Bulging radiator top and name on Moto Meter



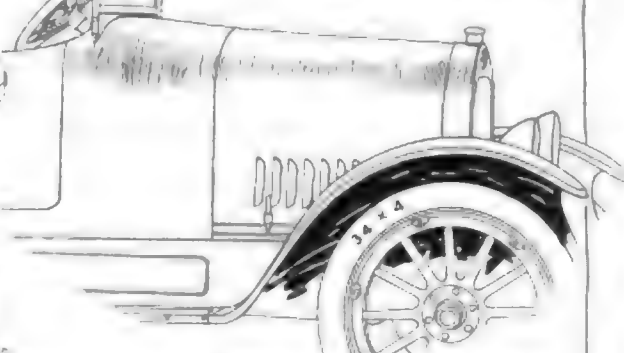
ABBOTT Distinctive name plate with figure 8 on radiator



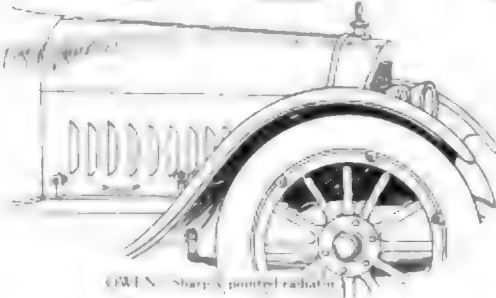
CHEVROLET Name plate



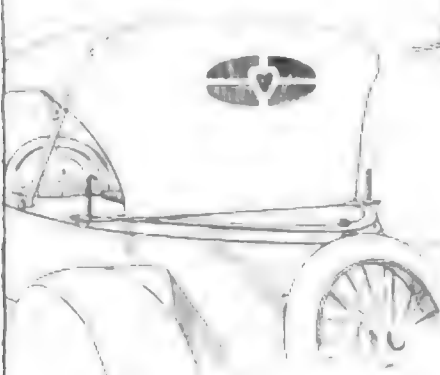
MOLINE KNIGHT Distinctive V radiator and filler



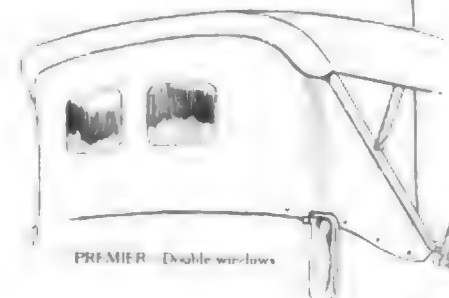
JEFFERY High, narrow radiator, short louvers



OWEN Sharp, pointed radiator

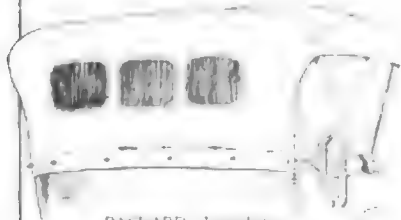


CROW LEELAND Distinctive



PREMIER Double windows

Individuality in Rear Curtains



PACKARD Triple lights



BUICK Three circles



AUBURN Series of marks



CADILLAC Four circles



LINCOLN Five circles



FORD Four circles

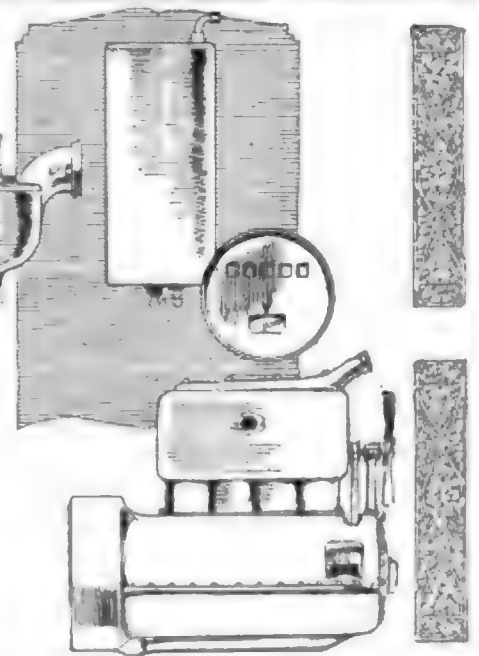
Complete Technical Details of Each of the Chassis Models of Gasoline Passenger Vehicles Produced by American Makers for the 1917 Season, Including Horsepower Ratings of Each, Cylinder Dimensions and Equipment

MAKE AND MODEL	No. of Cylinders	Bore and Stroke Inches	Piston Displacement, Cubic Inches	Gear Ratio on Direct	Make of Engine	Cylinder Shape	Camshaft Drive	Water Circulation	LUBRICATION		ELECTRIC SYSTEM		IGNITION			CARBURETION	
									System	Type of Pump	Generator Make	Voltage	System	Make	Control	Make of Carburetor	Fuel Feed
Abbott	6-44	6 3/4x4	224 0	4 75-1	Continental	L Helical	Cent	Splash-Press	Piston	Remy	6	Single	Remy	Hand	Stromberg	Vacuum	
Alford	14-60	4 3/4x5	155 5	4 33-1	Own	L Bevel	Ther	Pressure	Gear	U.S.L.	12	Single	Eisemann	Hand	Zenith	Vacuum	
Allen	Classic	4 3/4x5	230 9	4 00-1	Own	L Helical	Ther	Circ-Spl	Piston	Westinghouse	6	Single	Westinghouse	Hand	Stromberg	Vacuum	
American	A	6 3/4x5	212 0	4 42-1	Amco	L Helical	Cent	Circ-Spl	Piston	G&D	6	Single	G&D	Hand	Zenith	Carter	
Ama-Stirling		4 3/4x4	138 1	4 25-1	LeRoi	L Helical	Ther	Splash-Press	Piston	Bosch	12	Single	Bosch	Hand	Stromberg	Gravity	
Anderson	6-40	6 3/4x4	224 0	4 42-1	Continental	L Helical	Cent	Splash-Press	Piston	Westinghouse	6	Single	Westinghouse	Hand	Own	Gravity	
Apperson Roadplane	6-17	6 3/4x5	208 6	4 25-1	Own	L Helical	Cent	Pressure	Gear	Byur	6	Dual	Remy	Hand	Rayfield	Vacuum	
Apperson Roadplane	6-17	6 3/4x5	306 8	4 25-1	Own	L Helical	Ther	Pressure	Gear	Byur	6	Dual	Remy	Hand	Rayfield	Vacuum	
Arbore	25	4 3/4x5	165 9	4 25-1	Lycoming	L Helical	Ther	Splash	Piston	Apico	6	Single	Apico	Hand	Carter	Gravity	
Auburn	6-30	6 3/4x5	230 1	4 42-1	Trotter	L Helical	Cent	Circ-Spl	Piston	Remy	6	Single	Remy	Hand	Rayfield	Vacuum	
Auburn	6-44	6 3/4x5	303 1	4 00-1	Continental	L Helical	Cent	Circ-Spl	Piston	Delco	6	Single	Delco	Hand	Rayfield	Vacuum	
Austin Highway King	12	2x5	380 5	3 75-1	Wendely	L Helical	Cent	Pressure	Gear	Delco	6	Single	Delco	Hand	Stromberg	Vacuum	
Bell	17	4 3/4x5	192 4	4 25-1	Lycoming	L Helical	Ther	Circ-Spl	Piston	G&D	6	Single	At Kent	Hand	Carter	Vacuum	
Biddle	D	4 3/4x5	226 4	4 00-1	Special	L Helical	Ther	Circ-Spl	Gear	G&D	6	Single		Hand	Zenith	Vacuum	
Bow-Davis		6 3/4x4	224 0	4 42-1	Continental	L Spur	Cent	Splash-Press	Piston	G&D	6	Single	G&D	Hand	Stromberg	Vacuum	
Brower Knight		4 4x5	276 5	4 50-1	Own	L Chain	Cent	Pressure	Gear	U.S.L.	12	Single	Bosch	Hand	Zenith	Vacuum	
Briscoe	BA-24	4 3/4x5	163 5	4 23-1	Own	L Helical	Ther	Circ-Spl	Piston	Special	6	Single	Conn	Hand		Gravity	
Buck	D-34, D-35	4 3/4x4	170 0	4 04-1	Own	L Helical	Cent	Circ-Spl	Piston	Delco	6	Single	Delco	Hand	Marcel	Vacuum	
Buck D-44, D-45, D-46, D-47		6 3/4x4	224 0	4 08-1	Own	L Helical	Cent	Circ-Spl	Gear	Delco	6	Single	Delco	Hand	Marcel	Vacuum	
Cadillac	55	8 3/4x5	314 4	4 37-1	Own	L Chain	Cent	Pressure	Gear	Delco	6	Single	Delco	Atm	Own	Pressure	
Cameron		6 3/4x5	212 0	4 00-1	Amco	L Helical	Cent	Splash-Press	Piston	G&D	6	Single	G&D	Hand	Zenith	Vacuum	
Caso	T-17	4 1/2x6	247 7	4 60-1	Own	L Helical	Ther	Pressure	Piston	Auto-Lite	6	Single	Conn	Hand	Rayfield	Gravity	
Chalmers	6-30	6 3/4x4	224 0	4 75-1	Own	L Helical	Ther	Splash-Press	Gear	Westinghouse	6	Single	Remy	Hand	Stromberg	Vacuum	
Chalmers	6-30	6 3/4x4	224 0	5 15-1	Own	L Helical	Ther	Splash-Press	Gear	Westinghouse	6	Single	Remy	Hand	Stromberg	Vacuum	
Chandler	17	6 3/4x5	268 4	5 40-1	Own	L Chain	Cent	Circ-Spl	Piston	G&D	6	Single	Hess	Hand	Rayfield	Vacuum	
Charter Oak	A	6 3/4x5	414 7	3 77-1	Hership	T Spur	Cent	Pressure	Gear	Westinghouse	6	Single	Hess	Hand	Rayfield	Gravity	
Chevrolet	496	4 3/4x4	170 0	3 67-1	Own	L Helical	Ther	Splash-Press	Piston	Auto-Lite	6	Single	Conn	Hand	Rayfield	Gravity	
Chevrolet	F-5, F-2	4 3/4x4	170 0	4 25-1	Own	L Helical	Ther	Splash-Press	Piston	Auto-Lite	6	Single	Conn	Hand	Rayfield	Gravity	
Chevrolet	D	8 3/4x4	286 0	4 25-1	Own	L Helical	Cent	Circ-Spl	Piston	Auto-Lite	6	Single	Conn	Hand	Rayfield	Gravity	
Cole	6-60	8 3/4x4	445 4	4 45-1	Northway	L Spur	Cent	Pressure	Gear	Delco	6	Single	Delco	Hand	Stromberg	Vacuum	
Crow-Fikhart	CE-35	4 3/4x5	192 1	4 25-1	Lycoming	L Helical	Ther	Pressure	Gear	Dyneto	6	Single	Conn	Hand	Zenith	Gravity	

ABBREVIATIONS									
Make of Engine	Model	Year	Displacement	Valves	Compression Ratio	Ignition System	Lubrication System	Cylinder Shape	Stroke
Blow-By	Camshaft Drive	Water Circulation	Ignition System	Lubrication System	Cylinder Shape	Stroke	Ignition System	Lubrication System	Cylinder Shape
Type	Ignition System	Electric System	Water Circulation	Ignition System	Lubrication System	Cylinder Shape	Stroke	Ignition System	Lubrication System
Water Pump	Atmospheric Ignition Control	High Pressure	Water Circulation	Ignition System	Lubrication System	Cylinder Shape	Stroke	Ignition System	Lubrication System
Coarse Type	Selective	Sel. Planetary	Planetary	Coarse Type	Selective	Sel. Planetary	Planetary	Coarse Type	Selective
Coarse Type	Selective	Sel. Planetary	Planetary	Coarse Type	Selective	Sel. Planetary	Planetary	Coarse Type	Selective

1917 Passenger Cars

Specifications Comprise Every Mechanical Fact That Manufacturers, Dealers and Buyers Require—Motor Design Specially Analyzed, Giving Engine Crankers, Fuel Feeds and Oil-ing Systems; Also Transmission Features



Clutch Type	TRANSMISSION								RUNNING GEAR					Make of Speedometer	Crankshaft Bearings	Number	BEARINGS			MAKE AND MODEL	
	GEARSET			Final Drive	Car Drives Through	Rear Axle Type	Make of Rear Axle	Torque Taken By	Wheelbase	TIRES		Wheels	Rear Springs				Gearset	Rear Axle	Front Wheel		
	Type	Location	Forward Sp'ds							Front	Rear										
Plate	Sel.	Unit M.	3	Sp.B	Spring	Float	Salisbury	Spring	122	32x4	32x4	Wood	S-E	Stewart	Main	3	B&P	Roll.	Roll.	Abbott	6-44
Disk	Sel.	Unit M.	3	Sp.B	Spring	Semi-F	Timken	Spring	122	33x4	31x4	Wire	S-E	VanSicklen	Main	3	Ball	Roll.	Ball	Aland	14-60
Cone	Sel.	Unit M.	3	Bevel	Spring	Float	Adams	Tor.T	112	32x3	32x3	Wood	S-E	Stewart	Main	2	B&P	Ball.	Ball.	Allen	Classic
Plate	Sel.	Unit M.	3	Sp.B	Spring	Float	Salisbury	Spring	122	32x4	32x4	Wood	S-E	VanSicklen	Main	3	B&P	B&R	Ball	American	A
Plate	Sel.	Unit M.	3	Bevel	Spring	Semi-F	Special	Spring	110	30x3	30x3	Wood	S-E	Warner	Main	3	Ball	Roll.	Ball	Amo-Starting	
Plate	Sel.	Unit M.	3	Bevel	Spring	Semi-F	Mott	Spring	120	33x4	33x4	Wood	S-E	Stewart	Main	3	Ball	Ball	Ball	Anderson	6-40
Plate	Sel.	Amid	3	Sp.B	Spring	Float	Own	Spring	130	34x4	34x4	Wood	Full	VanSicklen	Main	4	Roll	Roll.	Roll.	Apperson Roadplane	6-17
Plate	Sel.	Amid	3	Sp.B	Spring	Float	Own	Spring	130	35x4	35x4	Wood	Full	VanSicklen	Main	3	Roll	Roll.	Roll.	Apperson Roadplane	8-17
Cone	Sel.	Unit M.	3	Bevel	Spring	Float	Geneco		108	30x3	30x3	Wood	Cent	Charter	Main	2	Ball	Roll	Ball	Arbore	25
Plate	Sel.	Unit M.	3	Sp.B	Spring	Float	Columbia	Tor.T	120	31x4	31x4	Wood	S-E		Main	3	B&P	Roll.	Ball.	Auburn	6-30
Plate	Sel.	Unit M.	3	Sp.B	Spring	Float	Columbia	Tor.T	131	35x4	35x4	Wood	Cent		Main	3	Ball	Roll.	Ball.	Auburn	6-44
Disk	Sel.	Unit M.	6	Sp.B	Spring	Float	Own	Spring	142	34x4	34x4	Wood	Cent	Warner	Main	4	Ball	B&R	Roll.	Austin Highway King	
Disk	Sel.	Unit M.	3	Bevel	Spring	Float	Adams	Spring	112	31x4	31x4	Wood	Full	Stewart	Main	2	Roll	Roll	Ball	Bell	17
Plate	Sel.	Unit M.	4	Bevel	Spring	Float	Special	Spring	122	32x4	32x4	Wire	Full	Warner	Main	3	Ball	B&R	Ball.	Biddle	11
Plate	Sel.	Unit M.	3	Sp.B	Spring	Float	Salisbury	Spring	118	32x4	32x4	Opt.	S-E	Warner	Main	3	B&P	H&R	Ball.	Bour-Davis	
Cone	Sel.	Unit T	3	Sp.B	Tor.T	Float	Own	Tor.T	125	34x4	34x4	Wood	Cent	Stewart	Main	3	Ball	Ball	Roll.	Brewster-Knight	
Cone	Sel.	Unit X	4	Bevel	Spring	Semi-F	Own	Tor.R	105	30x3	30x3	Wood	Full	Stewart	Main	2	B&P	B&R	Ball.	Briscoe	BA-24
Cone	Sel.	Unit M	3	Bevel	Spring	Float	West.M	Tor.T	108	31x4	31x4	Wood	S-E	Stewart	Main	3	H&R	B&R	Ball	Buick	D-34, D-35
Cone	Sel.	Unit M	3	Sp.B	Tor.T	Float	West.M	Tor.T	145	34x4	34x4	Wood	Cent	Stewart	Main	4	Ball	B&R	Ball.	Buick D-44, D-45, D-46, D-47	
Disk	Sel.	Unit M.	3	Sp.B	Spring	Float	Timken	Tor.M	125	36x4	36x4	Wood	Flat	Warner	Main	3	Ball	Roll.	Roll.	Cadillac	55
Plate	Sel.	Unit X	3	Sp.B	Roller	Float	Own	Tor.T	122	32x4	32x4	Wire	Cent		Main	3	Ball	Ball.	Ball.	Cameron	
Cone	Sel.	Unit M.	3	Sp.B	Tor.T	Float	Saunders	Tor.T	120	34x4	34x4	Wood	Cent	Stewart	Main	3	B&P	Roll.	Roll.	Care	T-17
Plate	Sel.	Unit M	3	Sp.B	Spring	Semi-F	Timken	Spring	115	33x4	33x4	Wood	S-E	Stewart	Main	3	Roll	Roll.	Roll.	Chalmers	6-30
Disk	Sel.	Unit M	3	Sp.B	Spring	Semi-F	Timken	Spring	117	34x4	34x4	Wood	S-E	Stewart	Main	3	Roll	Roll.	Roll.	Chalmers	6-30
Disk	Sel.	Unit M	3	Sp.B	Tor.T	Float	Own	Tor.T	123	34x4	34x4	Wood	S-E	Warner	Main	3	Ball	Ball	Roll.	Chandler	17
Disk	Sel.	Unit M	4	Sp.B	Spring	Float	Timken	Tor.R	105	30x3	30x3	Wood	S-E		Main	1	Roll	Roll	Roll.	Charter Oak	A
Cone	Sel.	Unit M.	3	Bevel	Spring	Float	Own	Spring	102	30x3	30x3	Wood	Cent	Stewart	Main	3	Ball	Roll	Ball	Chevrolet	490
Cone	Sel.	Unit M.	3	Bevel	Spring	Float	Own	Spring	112	31x4	31x4	Wire	Cent	Stewart	Main	1	Roll	Roll	Roll	Chevrolet	F-5, F-2
Cone	Sel.	Unit M.	3	Sp.B	Spring	Float	Own	Tor.T	120	33x4	33x4	Wood	S-E	Stewart	Main	3	B&P	Roll	Roll	Chevrolet	D
Cone	Sel.	Unit M.	3	Sp.B	Spring	Float	Timken	Spring	127	34x4	34x4	Wood	S-E	Warner	Main	3	B&P	Roll	Roll.	Cole	560
Plate	Sel.	Unit X	3	Bevel	Tor.T	Float	Own	Tor.T	115	30x3	30x3	Opt.	Full	Stewart	Main	3	Ball	Roll	Roll	Crow-Elkhart	CE 35

[illegible]



Specifications of American Passenger Cars, Including Horsepower,

MAKE AND MODEL	No. of Cylinders	Bore and Stroke, inches	Piston Displacement, cubic inches	Gear Ratio on Direct	Make of Engine	Cylinder Shape	Camshaft Drive	Water Circulation	LUBRICATION		ELECTRIC SYSTEM		IGNITION			CARBURETION	
									System	Type of Pump	Generator Make	Voltage	System	Make	Control	Make of Carburetor	Fuel Feed
Cunningham	V	3 1/2	441.7	4 08-1	Own	L	Helical	Cent.	Pressure	Gear	Westinghouse	6	Single	Westinghouse	Hand	Stromberg	Vacuum
Danahy	A	3 1/2	331.8	4 42-1	Horch-Sp	L	Helical	Cent.	Pressure	Gear	Westinghouse	6	Single	Westinghouse	Hand	Zenith	Vacuum
Davis	Light Six	6 3/4	234.0	4 42-1	Continental	L	Helical	Cent.	Splash-Press	Piston	Delco	6	Dual	Delco	Hand	Stromberg	Vacuum
Davis	Big Six	6 3/4	303.1	4 42-1	Continental	L	Helical	Cent.	Splash-Press	Gear	Delco	6	Dual	Delco	Atmo	Stromberg	Vacuum
Detroit	Six-45	6 3/4	234.0	4 75-1	Continental	L	Helical	Cent.	Splash-Press	Piston	Auto-Lite	7	Single	Conn.	Hand	Ball	Vacuum
Dispatch	G	4 3/4	220.0	4 00-1	Waukesha	L	Helical	Ther.	Pressure	Gear	U.S.L.	12	Single	Boech	Hand	Rayfield	Vacuum
Dixie Flyer		4 3/4	165.9	4 75-1	Lycoming	L	Helical	Ther.	Circ-Spl.	Piston	Dyneto	6	Single	Conn.	Hand	Carter	Vacuum
Dodge		4 3/4	212.3	3 50-1	Own	L	Helical	Cent.	Circ-Spl.	Imp	North East	12	Single	Delco	Atmo	Stewart	Vacuum
Dorris	1-B-6	6 4 1/2	377.0	4 08-1	Own	I	Helical	Cent.	Pressure	Gear	Westinghouse	6	Single	Boech	Hand	Stromberg	Vacuum
Dart	9	4 3/4	165.9	4 07-1	Own	L	Helical	Ther.	Circ-Spl.	Piston	Westinghouse	6	Single	Conn.	Hand	Carter	Gravity
Dressel	R-30-35	4 3/4	192.4	4 25-1	Own	I	Chain	Ther.	Circ-Spl.	Piston	Bijur	6	Single	Boech	Hand	Stromberg	Gravity
Dressel		4 3/4	192.4	4 42-1	Own	I	Chain	Ther.	Circ-Spl.	Piston	Bijur	6	Single	Boech	Hand	Stromberg	Vacuum
Drummond	B-17	8 3 1/2	282.7	4 42-1	Horch-Sp	L	Helical	Cent.	Pressure	Gear	Westinghouse	6	Single	Westinghouse	Hand	Zenith	Vacuum
Elcar	D.E.F.	4 3/4	192.4	4 08-1	Lycoming	L	Helical	Ther.	Circ-Spl.	Piston	Dyneto	6	Single	Delco	H&A	Carter	Vacuum
Elgin		6 3 1/4	180.2	4 50-1	Falls	I	Helical	Ther.	Circ-Spl.	Piston	Wagner	6	Single	Remy	Hand	Stromberg	Vacuum
Emerson		4 3/4	176.7	4 25-1	Own	L	Spur	Ther.	Non-Splash	Gear	Apple	6	Single	At Kent	Hand	Kingston	Vacuum
Empire	45	4 3/4	235.8	4 00-1	Torator	T	Helical	Ther.	Circ-Spl.	Piston	Auto-Lite	6	Single	Auto-Lite	Hand	Stromberg	Vacuum
Empire	67-8	6 3/4	234.0	4 42-1	Continental	L	Helical	Cent.	Splash-Press	Piston	Auto-Lite	6	Single	Conn.	Hand	Stromberg	Vacuum
Empire	70	6 3/4	234.0	4 35-1	Continental	L	Helical	Cent.	Splash-Press	Piston	Auto-Lite	6	Single	Conn.	Hand	Stromberg	Vacuum
Egert	Twin Unit Twelve	12 3 1/2	238.3	4 75-1	Own	I	Chain	Gear	Pressure	Gear	Westinghouse	6	Single	Remy	Hand	Stromberg	Gravity
Fiat	SS-E-17	4 3/4	357.0	2 75-1	Own	L	Helical	Cent.	Pressure	Gear	Westinghouse	6	Double	Westinghouse	Hand	Zenith	Pressure
Ford	T	4 3/4	176.7	3 63-1	Own	L	Spur	Ther.	Splash-Grav	Flywheel	Own	12	Single	Own	Hand	{Holley Kingston}	Gravity
Franklin		6 3/4	199.1	3 02-1	Own	I	Helical	Air	Pressure	Gear	Dyneto	12	Single	At Kent	Atmo	Own	Vacuum
F.R.P.	45-A	4 4 1/4	448.0	2 25-1	Own	I	Worm	Cent.	Splash-Press	Piston	Boech	12	2-Pt	Boech	Hand	Longmare	Pressure
F.R.P.	45-B	4 4 1/4	449.0	3 00-1	Own	I	Worm	Cent.	Splash-Press	Piston	Boech	12	2-Pt	Boech	Hand	Longmare	Pressure
Genova		6 4 1/2	414.7	3 77-1	Horch-Sp	T	Helical	Cent.	Splash-Press	Gear	Westinghouse	6	Single	Eisemann	Hand	Rayfield	Vacuum
Glide	6-40	6 3/4	230.1	4 04-1	Rutenber	L	Helical	Cent.	Splash-Press	Piston	Westinghouse	6	Single	Westinghouse	Hand	Rayfield	Vacuum
Grant	K	6 3 1/4	180.2	4 50-1	Own	I	Helical	Ther.	Non-Splash	Piston	Wagner	6	Single	Remy	Atmo	Stromberg	Vacuum
Hackett Four		4 3/4	187.7	4 00-1	G.B.&S	L	Chain	Ther.	Splash-Press	Piston	G&D	6	Single	G&D	Hand		Vacuum
HAL	21A	12 7/8	389.5	4 64-1	Weideby	I	Helical	Cent.	Pressure	Piston	Westinghouse	6	Single	Westinghouse	Hand	Stromberg	Vacuum
Harroun	A-1	4 3/4	174.2	4 00-1	Own	L	Helical	Ther.	Circ-Spl.	Piston	Own	6	Single	Boech	Hand	Roll	Gravity
Hatfield	H	4 3/4	187.7	4 25-1	G.B.&S	L	Chain	Ther.	Circ-Spl.	Piston	Deeo	12	Single	Conn.	Hand	Stromberg	Vacuum
Harvard	2-T	4 3 1/4	130.2	4 00-1	Sterling	L	Helical	Ther.	Circ-Spl.	Gear	Wagner	6	Dual		Hand	Zenith	Gravity
Haynes	36	6 3/4	288.8	4 42-1	Own	L	Helical	Cent.	Circ-Spl.	Piston	Leeco-N	6	Single	Remy	Hand	Rayfield	Vacuum
Haynes	37	6 3/4	288.8	4 42-1	Own	L	Helical	Cent.	Circ-Spl.	Piston	Leeco-N	6	Single	Remy	Hand	Rayfield	Vacuum
Haynes	40	12 1/2	356.4	4 42-1	Own	I	Chain	Cent.	Pressure	Gear	Leeco-N	6	Single	Delco	H&A	Rayfield	Vacuum
Haynes	41	12 1/2	356.4	4 42-1	Own	I	Chain	Cent.	Pressure	Gear	Leeco-N	6	Single	Delco	H&A	Rayfield	Vacuum
Hollier	106	6 3 1/4	180.2	4 50-1	Falls	I	Helical	Ther.	Circ-Spl.	Gear	Ally-Ch	6	Single	Remy	Hand	Stewart	Vacuum
Hollier	178	6 3 1/4	240.3	4 50-1	Own	I	Helical	Ther.	Pressure	Gear	Apico	6	Single	At Kent	Atmo		Vacuum
Homer Laughlin	D	8 2 1/2	120.0		Own	L	Chain	Ther.	Circ-Spl.		Disco	12	Single	At Kent	Atmo	Ensign	Pressure
Howard		6 3/4	224.0	4 75-1	Continental	L	Helical	Cent.	Splash-Press	Piston		6	Single	Delco	Hand	Stromberg	Vacuum
Hudson Super-Six		6 3/4	288.0	4 45-1	Own	L	Helical	Cent.	Circ-Spl.	Piston	Delco	6	Single	Delco	H&A	Own	Vacuum
Hupmobile	NR	4 3/4	242.9	4 64-1	Own	L	Chain	Ther.	Splash-Press	Flywheel	Westinghouse	6	Single	At Kent	H&A	Zenith	Gravity
Hupmobile	NU	4 3/4	242.9	4 64-1	Own	L	Chain	Ther.	Splash-Press	Flywheel	Westinghouse	6	Single	At Kent	H&A	Zenith	Gravity
Hupmobile	N	4 3/4	242.9	4 64-1	Own	L	Chain	Ther.	Splash-Press	Flywheel	Westinghouse	6	Single	At Kent	H&A	Zenith	Gravity
Hupmobile	NQ	4 3/4	242.9	4 64-1	Own	L	Chain	Ther.	Splash-Press	Flywheel	Westinghouse	6	Single	At Kent	H&A	Zenith	Gravity
Inter-State	T	4 3/4	192.4	4 00-1	Own	L	Helical	Ther.	Circ-Spl.	Gear	Remy	6	Single	Remy	Hand	Scheider	Gravity
Jackson Wolverine	349	9 3 1/2	197.9	4 75-1	Ferro	I	Helical	Ther.	Pressure	Gear	Auto-Lite	6	Single	Auto-Lite	Hand	Zenith	Vacuum
Jeffery	472	4 3/4	231.9	4 50-1	Own	L	Helical	Cent.	Splash-Press	Piston	Bijur	6	Single	Dixie	Hand	Stromberg	Vacuum
Jeffery	671	6 3/4	287.0	4 50-1	Own	L	Helical	Cent.	Splash-Press	Gear	Bijur	6	Single	Dixie	Hand	Rayfield	Vacuum

ABBREVIATIONS: Make of Engine: Continental, Continet, Horch-Sp, Golden, Belknap & Swartz, G.B.&S., Massena, Papp, Max-Th., Cylinder Shape: L-Head, I-Head, J-Head, T-Head, T. Camshaft Drive: Spur Gear, Spur Gear, Water Circulation: Centrifugal, Cent, Thermosyphon, Ther. Lubrication System: Splash-Press, Pressure, Circ-Spl., Oil Pump Type: Impeller, Imp. Electric System: Ward-Leonard, Ward-Leonard, G.A.D., Allen-Salmon, Allen-Ch, Leeco-N, Leeco-N, Ignition System: Dual-Coil, Dual-Coil, Ignition Make: Atmo, Atmo, Atmo, Ignition Control: Hand and Automatic, H&A, Automatic, Atmo. Make of Carburetor: Stromberg, Rayfield, Longmare, Longmare, Clutch Type: Multiple Disk, Mul-D. Gearset Type: Selective, Sel, Planetary, Plan, Friction, Fric. Gearset Location: Unit with Motor, Unit M; Unit with Axle, Unit A; Axle-Drive, Axle-D; Unit with Torque Tube, Unit T. Final Drive: Spiral

Carbureters, Crankers, Magnetos, Etc. for 1917—Continued

Clutch Type	TRANSMISSION							RUNNING GEAR					Make of Speedometer	Crankshaft Bearings		BEARINGS			MAKE AND MODEL	
	GEARSET			Final Drive	Car Drives Through	Rear Axle Type	Make of Rear Axle	Torque Taken By	Wooden	TIRES		Wheels		Rear Springs	Number	Gearset	Rear Axle	Front Wheel		
	Type	Location	Forward Sp'ds							Front	Rear									
Disk	Sel.	Unit M.	11	Sp.B.	Spring	Float		Tor.T	130	35x5	35x5	Wood	1 Ell	Stewart	Plain	3	B&R.		Roll.	Cunningham.....V
Disk	Sel.	Unit M.	3	Sp.B.	Spring	1 Float	Timken	Tor.T	127	34x4	34x4	Wood	S-E	Warner	Plain	3	B&R.	Roll.	Roll.	Daniels.....A
Cone	Sel.	Unit M.	2	Sp.B.	Spring	1 Float	Columbia	Spring	118	34x4	34x4	Wood	S-E	Stewart	Plain	3	Ball	Roll.	Roll.	Davis.....Light Six
Cone	Sel.	Unit M.	3	Sp.B.	Spring	1 Float	Columbia	Spring	124	34x4	34x4	Wood	S-E	Stewart	Plain	3	Ball	Roll.	Roll.	Davis.....Big Six
Plate	Sel.	Unit M.	3	Sp.B.	Spring	Semi-F	Timken	Spring	116	33x4	33x4	Wood	S-E	Stewart	Plain	3	B&P	Roll.	Roll.	Detroit.....Six-45
Control	Unit	Amid	4	Del Ch	Rad.Rd	Dead	Own	Rad.Rd	120	36x3	36x3	Wood	Ell	Corbin	Plain	3	Ball	Ball.	Ball	Dispatch.....G
Cone	Sel.	Unit M.	3	Sp.B.	Tor.T	Float	Peru	Tor.T	112	32x3	32x3	Wood	1 Ell	VanSicklen	Plain	2	BR&P	B&R.	Ball.	Disie Flyer.....
Disk	Sel.	Unit M.	3	Sp.B.	Spring	Float	Own	Tor.T	114	32x3	32x3	Wood	1 Ell	John-Man	Plain	3	Ball	Roll.	Roll.	Dodge.....
Disk	Sel.	Unit M.	2	Sp.B.	Spring	Float	Timken	Tor.T	128	36x4	36x4	Wood	S-E	Warner	Plain	7	Roll	Roll.	Roll.	Dorris.....1-2-4
Cone	Sel.	Unit M.	3	Bevel	Spring	1 Float	W-Weiss	Tor.T	105	30x3	30x3	Wood	Cant	Stewart	Plain	2	Ball	BR&P	Ball.	Dart.....9
Cone	Sel.	Unit M.	2	Bevel	Tor.T	Float	Peru	Tor.T	112	32x4	32x4	Wood	1 Ell	Stewart	Plain	2	Ball	Roll.	Ball	Dressel.....R-30-35
Disk	Sel.	Unit M.	3	Sp.B.	Spring	Semi-F	Timken	Spring	118	34x4	34x4	Wood	S-E	Stewart	Plain	2	Ball	Roll.	Roll.	Dressel.....
Disk	Sel.	Unit M.	3	Sp.B.	Tor.T	Float	Columbia	Tor.T	120	34x4	34x4	Wood	Cant		Plain	3	Roll	Roll.	Roll.	Drummond.....B-17
Plate	Sel.	Unit M.	3	Sp.B.	Spring	Float	Salisbury	Spring	116	32x3	32x3	Opt	S-E	Stewart	Plain	2	B&P	Roll.	Ball	Eker.....H.E.F.
Plate	Sel.	Unit M.	3	Sp.B.	Spring	Float	Salisbury	Tor.A	116	33x4	33x4	Opt	Cant	Stewart	Plain	3	Ball	Ball.	Ball.	Elgin.....
Disk	Sel.	Unit M.	3	Bevel	Spring	Semi-F	Own	Spring	110	30x3	30x3	Wood	S-E	Latra	Plain	3	Ball	B&R.	Ball.	Emerson.....
Cone	Sel.	Unit M.	3	Bevel	Spring	1 Float	West M	Tor.T	116	33x4	33x4	Wood	S-E		Plain	3	B&P	Roll.	Ball.	Empire.....45
Cone	Sel.	Unit M.	3	Bevel	Spring	1 Float	West M	Tor.T	120	34x4	34x4	Wood	1 Ell		Plain	3	B&P	Roll.	Ball.	Empire.....60-R
Plate	Sel.	Unit M.	3	Sp.B.	Spring	Float	Ham	Spring	120	34x4	34x4	Wood	1 Ell		Plain	3	B&P	Roll.	Ball.	Empire.....70
Plate	Sel.	Unit M.	2	Sp.B.	Spring	Float	Ham	Tor.T	116	32x4	32x4	Wood	Cant	Stewart	Plain	3	B&P	Roll.	Ball	Engar.....Twin Unit Twelve
Disk	Sel.	Amid	4	Bevel	Tor.T	Semi-F	Own	Tor.T	140	35x5	35x5	Wood	S-E	Warner	Plain	3	Ball	Ball.	Ball.	Fiat.....35-E-17
Mul-D	Plan	Unit M.	2	Bevel	Tor.T	Semi-F	Own	Tor.T	100	30x3	30x3	Wood	Tr-B-E	None	Plain	3	Plain	Roll.	Ball.	Ford.....T
Disk	Sel.	Amid	3	Sp.B.	Spring	Semi-F	Own	Spring	115	32x4	32x4	Wood	Ell	Warner	Plain	7	Ball	Roll.	Ball.	Franklin.....3
Cone	Sel.	Amid	4	Bevel	Spring	Float	Own	Tor.T	110	36x4	36x4	Wire	S-E		Plain	3	Ball	Roll.	Ball.	F.R.P.....45-A
Cone	Sel.	Amid	4	Bevel	Spring	Float	Own	Tor.T	140	36x4	36x4	Wire	S-E		Plain	3	Ball	Roll.	Ball.	F.R.P.....45-B
Disk	Sel.	Unit M.	4	Sp.B.	Spring	Float	Timken	Spring	139	34x4	34x4	Opt	S-E	Warner	Plain	3	Roll	Roll.	Roll.	Genova.....
Disk	Sel.	Unit M.	3	Sp.B.	Spring	1 Float	Amer	Spring	118	34x4	34x4	Wood	1 Ell	Stewart	Plain	3	B&P	Ball	Ball.	Glide.....6-40
Cone	Sel.	Unit M.	3	Bevel	Tor.T	Float	Peru	Tor.T	112	32x3	32x3	Wood*	Cant	Stewart	Plain	2	B&P	B&R.	Ball.	Grant.....K
Disk	Sel.	Unit M.	3	Bevel	Spring	1 Float	W-Weiss	Spring	112	31x4	31x4	Wood	1 Ell	Stewart	Plain	3	Roll	Roll.	Ball.	Hockett Four.....
Plate	Sel.	Unit M.	3	Sp.B.	Spring	Float	Timken	Spring	135	34x4	34x4	Opt	S-E		Plain	3	Ball	Roll.	Roll.	HAL.....21A
Cone	Sel.	Unit M.	3	Bevel	Spring	Float	Own	Tor.T	107	30x3	30x3	Wood	Cant		Plain	3	Ball	Roll.	Roll.	Harroon.....A-1
Disk	Sel.	Unit M.	2	Bevel	Spring	Float	Peru	Spring	106	31x4	31x4	Wood	Cant	Stewart	Plain	3	Ball	Roll.	Ball	Hatfield.....H
Cone	Sel.	Unit M.	3	Bevel	Spring	Semi-F	Detroit	Spring	100	28x3	28x3	Opt	Cant		Plain	3	B&P	B&R.	Ball	Harvard.....2-T
Plate	Sel.	Unit M.	3	Sp.B.	Spring	1 Float	Own	Spring	121	34x4	34x4	Wood	S-E	Stewart	Plain	3	Ball	Ball	Ball.	Haynes.....36
Plate	Sel.	Unit M.	3	Sp.B.	Spring	1 Float	Own	Spring	127	35x4	35x4	Wood	S-E	Stewart	Plain	3	Ball	Ball	Ball.	Haynes.....37
Plate	Sel.	Unit M.	3	Sp.B.	Spring	1 Float	Own	Spring	121	34x4	34x4	Wire	S-E	Warner	Plain	3	Ball	Ball	Ball.	Haynes.....40
Plate	Sel.	Unit M.	3	Sp.B.	Spring	1 Float	Own	Spring	127	34x4	34x4	Wire	S-E	Warner	Plain	3	Ball	Ball	Ball.	Haynes.....41
Cone	Sel.	Unit M.	3	Bevel	Tor.T	Float	Own	Spring	116	32x3	32x3	Wood	Cant	Stewart	Plain	3	Ball	Ball.	Roll.	Hellier.....186
Cone	Sel.	Unit M.	3	Bevel	Tor.T	Float	Own	Spring	116	34x4	34x4	Wood	Cant	Stewart	Plain	3	Ball	Ball.	Roll.	Hellier.....178
...	Frict.	Amid	3	Del Ch	Rad.Rd	Dead	Own		112	30x3	30x3	Wire	Cant	Stewart	Ball	2	Ball	Ball.	Ball.	Homer Laughlin.....D
Plate	Sel.	Unit M.	3	Sp.B.	Spring	Float	Ham	Spring	118	32x4	32x4	Opt	S-E		Plain	3	Ball	B&R.	Roll.	Howard.....
Disk	Sel.	Unit M.	3	Sp.B.	Spring	Semi-F	Timken	Spring	123	35x4	35x4	Wood*	S-E	Warner	Plain	4	R&P	Roll.	Roll.	Hudson Super-Six.....
Disk	Sel.	Unit M.	3	Sp.B.	Spring	1 Float	Own	Spring	119	34x4	34x4	Wood*	S-E	VanSicklen	Plain	3	B&R.	Ball.	Roll	Hupmobile.....NR
Disk	Sel.	Unit M.	3	Sp.B.	Spring	1 Float	Own	Spring	134	35x4	35x4	Wood*	S-E	VanSicklen	Plain	3	B&R.	Ball.	Roll	Hupmobile.....NU
Disk	Sel.	Unit M.	3	Sp.B.	Spring	1 Float	Own	Spring	119	34x4	34x4	Wood*	S-E	VanSicklen	Plain	3	B&R.	Ball	Roll	Hupmobile.....N
Disk	Sel.	Unit M.	3	Sp.B.	Spring	1 Float	Own	Spring	110	35x4	35x4	Wood*	S-E	VanSicklen	Plain	3	B&R.	Ball.	Roll.	Hupmobile.....NQ
Cone	Sel.	Unit X	3	Bevel	Tor.T	1 Float	Peru	Tor.T	110	33x4	33x4	Wood	1 Ell	Stewart	Plain	3	BR&P	B&R.	Ball.	Inter-State.....Y
Plate	Sel.	Unit M.	11	Bevel	Spring	1 Float	Salisbury	Spring	118	34x4	34x4	Wood	Ell		Plain	3	Roll	Roll.	Roll.	Jackson Wolverine.....349
Plate	Sel.	Unit M.	3	Sp.B.	Spring	Semi-F	Own	Spring	116	34x4	34x4	Wood	1 Ell		Plain	3	Roll	Roll.	Roll.	Jeffery.....472
Plate	Sel.	Unit M.	3	Sp.B.	Spring	Semi-F	Own	Spring	125	34x4	34x4	Wood	1 Ell		Plain	3	Roll	Roll.	Roll.	Jeffery.....671

Bevel, Sp.B., Car Drives Through: Radius Rod, Rad Rd., Torque Tube, Tor.T., Torque Arm, Tor. A., Rear Axle: Floating, Float., Semi-Floating, Semi-F., Three-quarter Floating, 1 Float. Make of Axles: Western-Mott, West. M., Walter-Weiss, W. Weiss. Rear Springs: Elliptic, Ell., Three-quarter Elliptic, 1 Ell., Semi-Elliptic, S-E., Cantilever, Cant., Platform, Plat., Transverse Semi-Elliptic, Tr-S-E. Bearings: Roller, Roll.; Ball and Roller, B&R.; Ball and Plain, B&P.; Ball, Roller and Plain, BR&P.; Cup and Cone, C&C. Make of Speedometer: John-Manville, John-Man. Fuel Feed: Stewart Vacuum Tank, Vacuum.

*Wire special equipment. †Wood optional.



Specifications of American Passenger Cars, Including Horsepower,

MAKE AND MODEL	No. of Cylinders	Bore and Stroke, inches	Piston Displacement, cubic inches	Gear Ratio on Direct	Make of Engine	Cylinder Shape	Camshaft Drive	Water Circulation	LUBRICATION		ELECTRIC SYSTEM		IGNITION			CARBURETION	
									System	Type of Pump	Generator Make	Voltage	System	Make	Control	Make of Carburetor	Fuel Feed
Janet	26-8	6 3/4x5 1/2	303 1	5 00-1	Lewis	L	Helical	Ther	Circ-Spl	Gear	Auto-Lite	6	Dual	Auto-Lite	Hand	Stromberg	Vacuum
Jordan	65	6 3/4x5 1/2	303 1	4 47-1	Continent	L	Helical	Cent	Splash-Press	Piston	Bijur	6	Single	Bosch	Hand	Stromberg	Vacuum
Kent	A	4 3/4x5	230 0	4 08-1	Continent	L	Helical	Ther	Circ-Spl	Piston	Bosch	12	Dual	Bosch	3-Pt	Zenith	Vacuum
King	EE	8 3/4x5	282 7	4 60-1	Own	L	Chain	Ther	Pressure	Gear	Ward-L	6	Single	At Kent	H&A	Ball	Vacuum
Kissel	6-42	6 3/4x5 1/2	340 3	4 58-1	Own	L	Helical	Cent	Non-Splash	Gear	Westinghouse	6	Single	Eschmann	Hand	Stromberg	Vacuum
Kissel	Hundred Pt. Six	6 3/4x5 1/2	348 9	4 58-1	Own	L	Helical	Cent	Circ-Spl	Piston	Remy	6	Single	Remy	Hand	Stromberg	Vacuum
Kline	6-38F	6 3/4x4 1/2	224 0	4 50-1	Continent	L	Helical	Cent	Splash-Press	Piston	Westinghouse	6	Single	Westinghouse	Hand	Rayfield	Vacuum
L	98	4 1/2x5 1/2	207 8		Rutenber	L	Spur	Cent	Circ-Spl	Piston	Remy	6	Single	Remy	Hand	Schebler	Vacuum
Lambert	80	6 3/4x4 1/2	224 0		Continent	L	Spur	Cent	Circ-Spl	Piston	Remy	6	Single	Remy	Hand	Schebler	Vacuum
Laurel	25	4 3/4x4 1/2	187 7	4 25-1	G.B.A.S.	L	Chain	Ther	Splash-Press	Piston		6	Single	Dixie	Hand	Schebler	Gravity
Lexington	6-O-17	6 3/4x4 1/2	224 0	4 75-1	Continent	L	Helical	Cent	Splash-Press	Piston	Westinghouse	6	Single	Conn.	Hand	Rayfield	Vacuum
Lexington	6-P	6 3/4x5 1/2	421 0	4 08-1	Continent	L	Helical	Cent	Splash-Press	Piston	Westinghouse	6	Double	Westinghouse	H&A	Stromberg	Vacuum
Liberty	16-A	6 3/4x4 1/2	207 1	4 75-1	Continent	L	Helical	Ther	Splash-Press	Piston	Delco	6	Single	Delco	Hand	Rayfield	Vacuum
Locomobile R-7	38	6 1/2x5	425 6	3 85-1	Own	T	Helical	Cent	Splash-Press	Gear	Westinghouse	6	Dual	Eschmann	Hand	Ball	Pressure
Locomobile M-7	48	6 4/2x5 1/2	524 8	3 65-1	Own	T	Helical	Cent	Splash-Press	Gear	Westinghouse	6	Dual	Eschmann	Hand	Ball	Pressure
Lorraine	17	6 3/4x5 1/2	347 9	4 00-1	Continent	L	Chain	Cent	Circ-Spl	Gear	Bosch	12	Double	Bosch	Hand	Schebler	Vacuum
Madison	4	6 3/4x5	230 1	4 64-1	Rutenber	L	Helical	Cent	Circ-Spl	Gear	Remy	6	Single	Remy	Hand	Rayfield	Vacuum
Madison	6	6 3/4x5	230 1	4 64-1	Rutenber	L	Helical	Cent	Circ-Spl	Gear	Remy	6	Single	Remy	Hand	Rayfield	Vacuum
Madison	6	6 3/4x5	230 1	4 64-1	Rutenber	L	Helical	Cent	Circ-Spl	Gear	Remy	6	Single	Remy	Hand	Rayfield	Vacuum
Madison	5	6 3/4x5	230 1	4 64-1	Rutenber	L	Helical	Cent	Circ-Spl	Gear	Remy	6	Single	Remy	Hand	Rayfield	Vacuum
Madison	7	6 3/4x5	230 1	4 64-1	Rutenber	L	Helical	Cent	Circ-Spl	Gear	Remy	6	Single	Remy	Hand	Rayfield	Vacuum
Malibon	A	4 3/4x4 1/2	122 7	4 00-1	Own	L	Helical	Ther	Splash-Press	Piston	Delco	12	Single	At Kent	Atmo	Zenith	Gravity
Majestic	M	8 3/4x5	292 7				Chain	Ther	Pressure	Gear	Rob Myers	6	Single	At Kent	Hand		Vacuum
Majestic	A	8 3/4x5	321 8				Helical	Ther	Pressure	Gear	Rob Myers	6	Single	At Kent	Hand		Vacuum
Marion-Handley A	6-60	6 3/4x5	230 1	4 42-1	Rutenber	L	Helical	Cent	Splash-Press	Piston	Westinghouse	6	Single	Westinghouse	Hand	Stromberg	Vacuum
Marion-Handley B	6-60	6 3/4x5 1/2	303 1	4 08-1	Continent	L	Helical	Cent	Splash-Press	Piston	Westinghouse	6	Single	Westinghouse	Hand	Stromberg	Vacuum
Morison	34	6 3/4x5 1/2	330 7	3 69-1	Own	I	Helical	Cent	Pressure	Gear	Bosch	12	Single	Bosch	Hand	Stromberg	Gravity
Maxwell	25	4 3/4x4 1/2	185 8	3 58-1	Own	L	Helical	Ther	Circ-Spl	Piston	Stamm-Huff	6	Dual	At Kent	Hand	K-D	Gravity
McFarlan		6 4/2x6	572 5	3 60-1	Teetor	T	Helical	Cent	Splash-Press	Piston	Westinghouse	6	Double	Bosch	Hand	Stromberg	Vacuum
Mercur	22-73	4 3/4x6	298 2	3 22-1	Own	L	Chain	Cent	Pressure	Gear	U.S.L.	12	Single	Bosch	Hand	Corcor	Vacuum
Mercur	22-73	4 3/4x6	298 2	3 57-1	Own	L	Chain	Cent	Pressure	Gear	U.S.L.	12	Single	Bosch	Hand	Corcor	Vacuum
Mets	25	4 3/4x4 1/2	188 7	4 00-1	Own	L	Spur	Ther	Non-Splash	Gear	G&D	6	Single	Dixie	Fixed	A. W. T.	Gravity
Mitchell	D-48	6 3/4x5	248 9	4 41-1	Own	L	Helical	Cent	Circ-Spl	Piston	Spittord	6	Single	Conn.	Hand	Rayfield	Vacuum
Mitchell	C-42	6 3/4x5	238 0	4 41-1	Own	L	Helical	Cent	Circ-Spl	Piston	Westinghouse	6	Single	Conn.	Hand	Rayfield	Vacuum
Maline-Knight C	MC-49	1 3/4x5 1/2	220 9	4 30-1	Own	I	Chain	Ther	Pressure	Gear	Wagner	6	Single	Conn.	Hand	Schebler	Vacuum
Maline-Knight C	MK-52	4 1/2x6	301 0	4 00-1	Own	I	Chain	Ther	Pressure	Gear	Wagner	6	Single	Conn.	Hand	Schebler	Vacuum
Monitor	CAR	4 3/4x4 1/2	187 7	4 00-1	G.B.A.S.	L	Chain	Ther	Pressure		Heinze	6	Dual	Heinze	Hand	Schebler	Vacuum
Monitor	N&O	6 3/4x4 1/2	224 0	4 00-1	Continent	L	Helical	Ther	Circ-Spl		Heinze	6	Dual	Heinze	Hand	Stromberg	Vacuum
Monroe	M-3	4 3/4x4 1/2	120 2	4 25-1	Stirling	I	Helical	Ther	Circ-Splash	Piston	Auto-Lite	6	Single	Conn.	Hand	Zenith	Gravity
Monroe	M-4	4 3/4x4 1/2	149 3	4 75-1	Own	I	Helical	Ther	Pressure	Gear	Auto-Lite	6	Single	Conn.	Hand	Zenith	Vacuum
Moon	6-43	6 3/4x4 1/2	224 0	4 75-1	Continent	L	Helical	Cent	Splash-Press	Piston	Delco	6	Single	Delco	Hand	Rayfield	Vacuum
Moon	6-46	6 3/4x5 1/2	308 3	4 42-1	Continent	L	Helical	Cent	Splash-Press	Piston	Delco	6	Single	Delco	Atmo	Rayfield	Vacuum
Moore 30	35	4 3/4x4 1/2	187 7	3 70-1	G.B.A.S.	L	Chain	Ther	Circ-Spl	Gear	Delco	6	Single	Dixie	Hand	Schebler	Vacuum
Murray	76-T	8 3/4x5	331 8	4 47-1	Herb-Sp	L	Helical	Cent	Pressure	Gear		6	Single	Dixie	Hand	Zenith	Vacuum
Napoleon	30	4 3/4x5	192 4	4 00-1	Lycoming	L	Helical	Ther	Circ-Spl	Piston	Dyneto	6	Single	Conn.	Hand	Carter	Vacuum
National Highway	6	6 3/4x5 1/2	303 1	4 58-1	Own	L	Helical	Cent	Splash-Press	Piston	Westinghouse	6	Single	Dixie	Hand	Rayfield	Vacuum
National Highway	12	12 2 1/4x4 1/2	370 1	5 00-1	Own	L	Helical	Cent	Pressure	Gear	Bijur	6	Single	Delco	Hand	Rayfield	Vacuum
Oakland	34	6 2 1/4x4 1/2	177 0	4 50-1	Northway	I	Helical	Cent	Circ-Spl	Piston	Delco	6	Single	Delco	Hand	Marcel	Vacuum
Oakland	50	8 3/4x5 1/2	346 3	4 09-1	Northway	L	Helical	Cent	Splash-Press	Gear	Delco	6	Single	Delco	H&A	Stromberg	Vacuum
Ogren	102	6 3/4x5 1/2	347 9	3 75-1	Continent	L		Cent	Pressure	Gear	Westinghouse	6	Dual	Bosch	H&A	Rayfield	Vacuum
Oldsmobile	45	8 2 1/4x4 1/2	246 7	4 92-1		L	Helical	Cent	Pressure	Gear	Delco	6	Single	Delco	H&A	Johnson	Vacuum
Overland	90	4 3/4x5	178 9	3 75-1	Own	L	Helical	Ther	Circ-Spl	Piston	Auto-Lite	6	Single	Conn.	Hand	Tillotson	Vacuum
Overland	85	4 1 1/4x4 1/2	220 0	4 00-1	Own	L	Helical	Ther	Circ-Spl	Gear	Auto-Lite	6	Single	Conn.	Hand	Tillotson	Vacuum
Overland	85	6 3/4x4 1/2	224 0	4 90-1	Continent	L	Helical	Cent	Pressure	Gear	Auto-Lite	6	Single	Conn.	Hand	Tillotson	Vacuum
Owen Magnetic	M-25	6 3/4x5 1/2	303 1	4 50-1	Continent	L	Helical	Cent	Splash-Press	Piston	Own	24	Single	Bosch	Hand	Zenith	Vacuum
Owen Magnetic	O-36	6 3/4x5 1/2	364 5	3 50-1	Buda	L	Helical	Cent	Splash-Press	Gear	Own	24	Single	Bosch	Hand	Zenith	Vacuum

ABBREVIATIONS: Make of Engine: Continental, Continet; Herschel-Spallman, Herb-Sp; Golden, Belknap & Swarts, G.B.A.S.; Maxwell-Phipps, Max-Ph. Cylinder Shape: I-Head, L-Head, T-Head, T. Camshaft Drive: Spur Gear, Spur. Water Circulation: Centrifugal, Cent. Therm-siphon, Ther. Lubrication System: Splash-Pressure, splash-Press, Circulatore-Splash, Circ-Spl, Oil Pump Type: Impeller, Imp. Electric System: Ward-Leonard, Ward-L; Gray & Davis, G&D; Allen-Chalmers, Allen-Ch; Leeco-Neville, Leeco-N. Ignition System: Dual-Double, Dual-D. Ignition Make: At-water Kent, At Kent. Ignition Control: Hand and Automatic, H&A, Automatic, Atmo. Make of Carburetor: Reichertz, Reichertz, Longmarch, Longmarch. Clutch Type: Multiple Disk, Mul-D. Gearset Type: Selective, Sel, Planetary, Plan, Friction, Fric. Gearset Location: Unit with Motor, Unit M, Unit with Axle, Unit X, Am-Ship, Amid; Unit with Torque Tube, Unit T. Final Drive: Spiral

Carbureters, Crankers, Magnetos, Etc. for 1917—Continued

Clutch Type	TRANSMISSION							RUNNING GEAR					Make of Speedometer	Crankshaft Bearings	BEARINGS			MAKE AND MODEL				
	GEARSET			Car Drives Through	Rear Axle Type	Make of Rear Axle	Torque Taken By	Wheelbase	TIRES		Wheels	Rear Springs			Number	Gearset	Rear Axle		Front Wheel			
	Type	Location	Forward Sp'ds						Front	Rear												
Plate	Sel.	Unit M.	3	Bevel	Spring	Float	Timken	Spring	125	35x4	35x4	Wood	S-E	Plain	1	Hall	Roll.	Roll.	James	26-B		
Disk	Sel.	Unit M.	3	Sp.B	Spring	Semi-F	Timken	Spring	127	35x4	35x4	Wood	S-E	VanSticklen	Plain	3	Ball.	Roll.	Roll.	Jordan	80	
Disk	Sel.	Unit M.	3	Sp.B	Spring	Float	Timken	Spring	116	32x4	32x4	Opt.	Ell	Plain	1	Plain	Plain	Roll.	Kent	A		
Plate	Sel.	Unit M.	3	Sp.B	Spring	Float	American	Tor.A	120	34x4	34x4	Wood	Cant	Stewart	Plain	3	R&P	Roll.	Roll.	King	EE	
Disk	Sel.	Unit M.	3	Sp.B	Spring	Float	Own	Spring	128	34x4	34x4	Wood	Ell	Stewart	Plain	3	Ball.	Roll.	Roll.	Kissel	6-42	
Coar	Sel.	Unit M.	3	Sp.B	Spring	Float	Own	Spring	117	32x4	32x4	Opt.	Ell	Stewart	Plain	3	Ball.	Roll.	Roll.	Kissel	Hundred Pt Six	
Plate	Sel.	Unit M.	3	Sp.B	Spring	Float	Hom	Spring	120	34x4	34x4	Wood	Ell	Plain	3	Ball.	Roll.	Roll.	Kline	6-38 F		
	Fric.					Semi-F	Salisbury		115	34x4	34x4	Wood	Ell	Plain	3		Roll.	Roll.	Lambert	30		
	Fric.					Semi-F	Salisbury		112	32x4	32x4	Wood	Ell	Plain	3		Roll.	Roll.	Lambert	80		
Disk	Sel.	Unit M.	3	Bevel	Spring	Float	Peru	Tor.T	112	32x3	32x3	Wood	Cant	Stewart	Plain	3	Ball.	Roll.	Roll.	Laurel	35	
Plate	Sel.	Unit M.	3	Sp.B	Spring	Float	Hew	Spring	116	32x4	32x4	Wood	Ell	Stewart	Plain	3	B&P	Roll.	Roll.	Lexington	6-O-17	
Coar	Sel.	Unit M.	3	Sp.B	Spring	Float	Timken	Tor.T	144	30x4	30x4	Wood	Ell	Stewart	Plain	3	Ball.	Roll.	Roll.	Lexington	6-P	
Plate	Sel.	Unit M.	3	Sp.B	Spring	Semi-F	Timken	Spring	115	32x4	32x4	Wood	S-E	Plain	3	Ball.	Roll.	Roll.	Liberty	19-A		
Disk	Sel.	Amid	4	Sp.B	Rad.Rd	Float	Own	Tor.A	130	36x4	37x5	Wood	Ell	Warner	Plain	7	Ball.	Roll.	Roll.	Locomobile R-7	28	
Disk	Sel.	Amid	4	Sp.B	Rad.Rd	Float	Own	Tor.A	142	37x5	37x5	Wood	Ell	Warner	Plain	7	Ball.	Roll.	Roll.	Locomobile M-7	48	
Disk	Sel.	Unit M.	3	Sp.B	Spring	Float	Hom	Spring	123	35x4	35x4	Wood	S-E	Plain	3	Ball.	B&R	Roll.	Leverne	17		
Disk	Sel.	Unit M.	3	Sp.B	Spring	Float	American	Spring	120	34x4	34x4	Wood	Ell	Stewart	Plain	3	Ball.	Roll.	Roll.	Madison	4	
Disk	Sel.	Unit M.	3	Sp.B	Spring	Float	American	Spring	115	34x4	34x4	Wood	Ell	Stewart	Plain	3	Ball.	Roll.	Roll.	Madison		
Disk	Sel.	Unit M.	3	Sp.B	Spring	Float	American	Spring	124	34x4	34x4	Wood	Ell	Stewart	Plain	3	Ball.	Roll.	Roll.	Madison		
Disk	Sel.	Unit M.	3	Sp.B	Spring	Float	American	Spring	115	34x4	34x4	Wood	Ell	Stewart	Plain	3	Ball.	Roll.	Roll.	Madison	5	
Disk	Sel.	Unit M.	3	Sp.B	Spring	Float	American	Spring	124	34x4	34x4	Wood	Ell	Stewart	Plain	3	Ball.	Roll.	Roll.	Madison	7	
Disk	Sel.	Unit M.	3	Bevel	Spring	Float	Detroit	Spring	105	30x3	30x3	Opt.	S-E	Stewart	Plain	2	Ball.	Roll.	Roll.	Maibohm	A	
Plate	Sel.	Unit M.	3	Sp.B	Spring	Float		Spring	125	32x4	32x4	Wood	S-E	Stewart	Plain	3	B&R	Roll.	Roll.	Majestic	M	
Plate	Sel.	Unit M.	3	Sp.B	Spring	Float		Spring	135	35x5	35x5	Wire	S-E	Stewart	Plain	3	B&R	Roll.	Roll.	Majestic	A	
Disk	Sel.	Unit M.	3	Sp.B	Spring	Float	Salisbury	Spring	120	32x4	32x4	Wood	S-E	Stewart	Plain	3	B&P	Roll.	Roll.	Marion-Handley A	6-40	
Disk	Sel.	Unit M.	3	Sp.B	Spring	Float	Salisbury	Spring	125	35x4	35x4	Wood	S-E	Stewart	Plain	3	Ball.	B&R	Roll.	Marion-Handley B	6-40	
Coar	Sel.	Unit T	3	Sp.B	Tor.T	Float	Own	Tor.T	136	34x4	34x4	Wire	Trace	VanSticklen	Plain	4	B&P	Roll.	Roll.	Marmen	34	
Coar	Sel.	Unit M.	3	Bevel	Spring	Float	Own	Tor.T	103	30x3	30x3	Wood	Ell	Stewart	Plain	2	R&P	Roll.	Roll.	Marvell	25	
Plate	Sel.	Amid	3	Sp.B	Spring	Float	Timken	Tor.A	136	35x5	35x5	Opt.	S-E	Warner	Plain	4	Roll.	Roll.	Roll.	McFarlan		
Disk	Sel.	Amid	4	Sp.B	Spring	Float	Own	Spring	115	32x4	32x4	Wood	S-E	Warner	Plain	3	Ball.	B&R	Roll.	Mercer	22-73	
Disk	Sel.	Amid	4	Sp.B	Spring	Float	Own	Spring	132	34x4	34x4	Wood	S-E	Warner	Plain	3	Ball.	B&R	Roll.	Mercer	22-73	
	Fric.	Amid	7	S.Chain	Rad.Rd	Float	Own	Rad.Rd	106	32x3	32x3	Wood	Ell	A W T	Plain	3		Roll.	Roll.	Metz	25	
Coar	Sel.	Amid	3	Sp.B	Spring	Float	Own	Tor.T	180	32x4	32x4	Wood	Cant	Stewart	Plain	3	B&P	B&R	Roll.	Mitchell	D-49	
Coar	Sel.	Amid	3	Bevel	Spring	Float	Own	Tor.T	127	34x4	34x4	Wood	Cant	Stewart	Plain	3	B&P	B&R	Roll.	Mitchell	C-42	
Coar	Sel.	Amid	3	Sp.B	Rad.Rd	Semi-F	Timken	Rad.Rd	114	34x4	34x4	Wood	Trans	Stewart	Plain	3	R&P	Roll.	Roll.	Moline-Knight C	MY-40	
Coar	Sel.	Amid	3	Sp.B	Rad.Rd	Float	West.M	Rad.Rd	122	35x4	35x4	Wire	Trans	Stewart	Plain	3	R&P	Roll.	Roll.	Moline-Knight G	MY-50	
Disk	Sel.	Unit M.	3	Bevel	Spring	Semi-F	Russell	Spring	109	32x3	32x3	Wood	Ell	Plain	3	B&R	Roll.	Roll.	Monitor	C&R		
Disk	Sel.	Unit M.	3	Bevel	Spring	Semi-F	Russell	Spring	115	33x4	33x4	Wood	Ell	Plain	3	B&R	Roll.	Roll.	Monitor	N&O		
Thick Disk	Sel.	Unit M.	3	Bevel	Spring	Float	West.M	Spring	90	30x3	30x3	Wood	Ell	Stewart	Plain	2	Roll.	Roll.	Roll.	Monroe	M-1	
Disk	Sel.	Unit M.	3	Sp.B	Tor.A	Special	Hom	Tor.A	115	32x4	32x4	Wood	Cant	Stewart	Plain	2	Ball.	Roll.	Roll.	Monroe	M-4	
Disk	Sel.	Unit M.	3	Sp.B	Spring	Float	Hew	Spring	114	31x4	33x4	Wood	S-E	Stewart	Plain	3	B&P	B&R	Roll.	Moon	6-43	
Disk	Sel.	Unit M.	3	Sp.B	Spring	Semi-F	Timken	Spring	125	35x4	35x4	Wood	S-E	Stewart	Plain	3	B&P	Roll.	Roll.	Moon	6-46	
Disk	Sel.	Unit M.	3	Sp.B	Tor.A	Float	Peru	Tor.T	106	30x3	30x3	Wood	Cant	Plain	3	Roll.	B&P	Roll.	Roll.	Moore 30	35	
Plate	Sel.	Unit M.	3	Sp.B	Spring	Float	Timken	Spring	128	34x4	34x4	Opt.	Ell	Warner	Plain	3	Roll.	Roll.	Roll.	Murray	70-T	
Disk	Sel.	Unit M.	3	Bevel	Spring	Semi-F		Tor.T	112	31x4	31x4	Wood	Cant	Plain	2	Ball.	Roll.	Roll.	Roll.	Napoleon	38	
Coar	Sel.	Unit M.	3	Sp.B	Spring	Float	Columbia	Tor.R	128	34x4	34x4	Wood	Cant	Warner	Plain	3	Ball.	Roll.	Roll.	National Highway	6	
Coar	Sel.	Unit M.	3	Sp.B	Spring	Float	Columbia	Tor.R	128	34x4	34x4	Wood	Cant	Warner	Plain	3	Ball.	Roll.	Roll.	National Highway	12	
Coar	Sel.	Unit M.	3	Bevel	Spring	Float	West.M	Spring	112	32x4	32x4	Wood	S-E	Plain	3	B&P	Roll.	Roll.	Roll.	Oakland	34	
Coar	Sel.	Unit M.	3	Sp.B	Spring	Float	West.M	Spring	127	34x4	34x4	Wood	Ell	Plain	3	B&P	Roll.	Roll.	Roll.	Oakland	50	
Disk	Sel.	Unit M.	3	Bevel	Spring	Float	Timken	Spring	132	34x4	34x4	Wire	S-E	Stewart	Roll.	Roll.	Roll.	Roll.	Ogren	101		
Coar	Sel.	Unit M.	3	Sp.B	Spring	Float	West.M	Spring	120	33x4	33x4	Wood	Ell	Stewart	Plain	2	B&R	Roll.	Roll.	Roll.	Oldemobile	45
Coar	Sel.	Unit X	3	Bevel	Tor.T	Float	Own	Tor.T	104	31x4	31x4	Wire	Cant	Stewart	Plain	2	B&R	B&R	Roll.	Overland	99	
Coar	Sel.	Unit X	3	Bevel	Tor.T	Float	Own	Tor.T	112	32x4	32x4	Wood	Cant	Stewart	Plain	5	B&R	B&R	Roll.	Overland	85	
Coar	Sel.	Unit X	3	Sp.B	Tor.T	Float	Own	Tor.T	116	32x4	32x4	Wood	Cant	Stewart	Plain	3	B&R	B&R	Roll.	Overland	85	
Oven			6	Sp.B	Spring	Float	Timken	Spring	125	34x4	34x4	Wood	S-E	Warner	Plain	3	Roll.	Roll.	Roll.	Oven Magnetic	M-25	
Oven			6	Sp.B	Spring	Float	American	Tor.T	136	35x5	35x5	Wire	S-E	Warner	Plain	4	Roll.	Roll.	Roll.	Oven Magnetic	O-38	

Bevel, Sp.B. Car Drives Through: Radius Rods, Ball Rod, Torsion Tube, Tor.T. Torque Arm, Tor.A. Rear Axle: Floating, Float, Semi-Floating, Semi-F. Three-quarter Floating, Float. Make of Axle: Weston-Mott, West.M.; Walker-Weiss, W.Weiss. Rear Springs: Elliptic, Ell; Three-quarter Elliptic, Ell; Semi-Elliptic, S-E; Cantilever, Cant; Platform, Plat; Transverse Semi-Elliptic, Tr S-E. Bearings: Roller, Roll; Ball and Roller, B&R; Ball and Plain, B&P; Ball, Roller and Plain, BR&P; Cup and Cone, C&C. Make of Speedometer: Johns-Manville, John-Man. Fuel Feed: Stewart Vacuum Tank, Vacuum.

*Wire special equipment. †Wood optional.



Specifications of American Passenger Cars, Including Horsepower,

MAKE AND MODEL	No. of Cylinders	Bore and Stroke, Inches	Piston Displacement, Cubic Inches	Gear Ratio on Direct	Make of Engine	Cylinder Shape	Cam-shaft Drive	Water Circulation	LUBRICATION		ELECTRIC SYSTEM		IGNITION			CARBURETION	
									System	Type of Pump	Generator Make	Voltage	System	Make	Control	Make of Carburetor	Fuel Feed
Packard 2-25, 2-35	12	3 1/2 x 5	424 1	4 36-1	Own	I. Chain	Cent	Cent	Pressure	Gear	Bijur	6	Single	Delco	H&A	Own	Pressure
Paige Fleetwood	6-35	6 3 1/2 x 5	250 1	4 41-1	Rutenber	L. Helical	Cent	Cent	Splash-Press	Piston	G&D	6	Single	Remy	Hand	Rayfield	Gravity
Paige Fairfield	6-46	6 3 1/2 x 5 1/2	303 1	4 35-1	Continent	L. Helical	Cent	Cent	Splash-Press	Piston	G&D	6	Single	Remy	Hand	Rayfield	Gravity
Partin-Palmer	20	4 3 1/2 x 4	138 1	4 00-1	LeRoi	L. Helical	Ther	Ther	Circ-Spl	Piston	Allis-Ch.	6	Single	Conn.	Hand	Schebler	Gravity
Partin-Palmer	32	4 3 1/2 x 5	192 4	4 00-1	Lycorning	L. Helical	Ther	Ther	Circ-Spl	Gear	Duco	6	Single	Conn.	Hand	Carter	Vacuum
Peterson	6-45	6 3 1/2 x 4	224 0	4 50-1	Continent	L. Helical	Cent	Cent	Splash-Press	Piston	Delco	6	Dual	Delco	Hand	Stromberg	Vacuum
Pathfinder	2B-TC-2C	12 2 1/2 x 5	289 5	4 33-1	Weidely	I. Helical	Gear	Gear	Pressure	Gear	Delco	6	Duplex	Delco	H&A	Stromberg	Vacuum
Pathfinder	3B	12 2 1/2 x 5	349 5	4 33-1	Weidely	I. Helical	Cent	Cent	Splash-Press	Gear	Delco	6	Single	Delco	H&A	Stromberg	Gravity
Peerless	56	8 3 1/2 x 5	331 6	4 45-1	Own	L. Helical	Cent	Cent	Pressure	Gear	G&D	6	Single	At Kent	H&A	Ball	Vacuum
Phaenax	M	4 3 1/2 x 4	267 0	4 00-1	Own	L. Chain	Cent	Cent	Pressure	Gear	Ward-L.	6	Single	Boech	Hand	H&N	Vacuum
Pierce-Arrow	35-C-4	6 4 1/2 x 5	414 7	3 78-1	Own	T. Helical	Cent	Cent	Pressure	Gear	Westinghouse	6	Dual-D.	Boech	Hand	Own	Pressure
Pierce-Arrow	45-B-4	6 4 1/2 x 5	524 8	3 33-1	Own	T. Helical	Cent	Cent	Pressure	Gear	Westinghouse	6	Dual-D.	Boech	Hand	Own	Pressure
Pierce-Arrow	64-A-4	6 5 1/2 x 7	624 7	2 68-1	Own	T. Helical	Cent	Cent	Pressure	Gear	Westinghouse	6	Dual-D.	Boech	Hand	Own	Pressure
Pilot	6-45	6 3 1/2 x 5	230 1	4 75-1	Tector	L. Helical	Cent	Cent	Splash-Press	Gear	Delco	6	Single	Delco	Hand	Zenith	Vacuum
Premier	6-8	6 3 1/2 x 5	295 3	4 45-1	Own	I. Helical	Cent	Cent	Splash-Press	Gear	Delco	6	Single	Delco	Atmte	Johnson	Vacuum
Primrose	4-36-F	4 3 1/2 x 4	187 7	4 25-1	G.B.&S.	L. Chain	Ther	Ther	Circ-Spl	Piston	Duco	6	Single	Splitdorf	Hand	Schebler	Vacuum
Pullman	424-32	4 3 1/2 x 4	187 7	4 60-1	G.B.&S.	L. Chain	Ther	Ther	Splash-Press	Piston	Splitdorf	6	Single	Dixie	Hand	Stromberg	Vacuum
Regal	J	4 3 1/2 x 4	182 8	4 25-1	Own	L. Helical	Ther	Ther	Circ-Spl	Piston	Heinze	6	Single	Heinze	Hand	Carter	Vacuum
Regal	F	8 3 1/2 x 4	254 4	4 00-1	Own	L. Helical	Ther	Ther	Pressure	Gear	Dyneto	12	Single		Hand	Johnson	Vacuum
Reo	R	4 4 1/2 x 4	240 5	4 20-1	Own	L. Helical	Cent	Cent	Circ-Spl	Piston	Remy	6	Single	Remy	Hand	Johnson	Press-Grav
Reo	M	6 3 1/2 x 5	306 6	4 30-1	Own	L. Helical	Cent	Cent	Circ-Spl	Piston	Remy	6	Single	Remy	Hand	Johnson	Vacuum
Richmond	6-17	6 3 1/2 x 5	288 6	4 25-1	Own	L. Helical	Cent	Cent	Splash-Press	Piston	Delco	6	Single	Delco	Hand	Stromberg	Vacuum
Rosmar		6 3 1/2 x 5	230 1	4 42-1	Rutenber	L. Helical	Cent	Cent	Splash-Press	Gear	Bijur	6	Dual	Boech	Hand	Stromberg	Vacuum
Ross	C	8 3 1/2 x 5	331 5	4 64-1	Hersh-Sp	L. Helical	Cent	Cent	Pressure	Gear	Ward-L.	6	Single	At Kent	H&A	Zenith	Vacuum
Saxon	B-5-R	4 2 1/2 x 4	94 0	5 00-1	Continent	L. Helical	Ther	Ther	Circ-Spl	Piston	Wagner	6	Single	At Kent	Atmte	Reichh	Gravity
Saxon	S-4	6 2 1/2 x 4	175 3	4 75-1	Continent	L. Helical	Ther	Ther	Circ-Spl	Piston	Wagner	6	Single	Remy	Hand	Rayfield	Gravity
Scraps-Booth	D	8 2 1/2 x 3	162 3	4 80-1	Ferro	I. Helical	Ther	Ther	Pressure	Gear	Wagner	6	Single	Remy	Atmte	Zenith	Vacuum
Simplex		6 4 1/2 x 5	343 7		Own	L. Chain	Cent	Cent	Pressure	Gear	Boech	6	Dual	{Boech. Siemann}	Hand	Newcomb	Pressure
Singer	17	6 4 1/2 x 5	414 7	3 77-1	Hersh-Sp	T. Helical	Cent	Cent	Pressure	Gear	Westinghouse	6	Single	Boech	Hand	Rayfield	Vacuum
Standard	E	8 3 1/2 x 5	282 7	4 45-1	Hersh-Sp	L. Helical	Cent	Cent	Pressure	Gear	Westinghouse	6	Single	Westinghouse	Hand	Zenith	Vacuum
Standard	F	8 3 1/2 x 5	331 8	4 40-1	Hersh-Sp	L. Helical	Cent	Cent	Pressure	Gear	Apple	6	Single	Dixie	Hand	Zenith	Vacuum
Stearns-Knight	SKL-32	4 3 1/2 x 5	248 5	4 50-1	Own	I. Chain	Cent	Cent	Splash-Press	Gear	Westinghouse	12	Single	Remy	Hand	Schebler	Gravity
Stearns-Knight	SKB-33	8 3 1/2 x 5	331 8	4 75-1	Own	I. Chain	Ther	Ther	Splash-Press	Gear	Westinghouse	12	Single	Remy	Hand	Rayfield	Vacuum
Stephens	60-65	6 3 1/2 x 4	224 0	4 75-1	Continent	L. Helical	Cent	Cent	Circ-Spl	Piston	Auto-Lite	6	Single	Conn.	Hand	Zenith	Vacuum
Studebaker	SF-4-40	4 3 1/2 x 5	235 8	4 00-1	Own	L. Helical	Cent	Cent	Circ-Spl	Gear	Wagner	6	Single	Remy	Hand	Schebler	Vacuum
Studebaker	ED-6-30	6 3 1/2 x 5	333 8	3 70-1	Own	L. Helical	Cent	Cent	Circ-Spl	Gear	Wagner	6	Single	Remy	Hand	Schebler	Vacuum
Stutz	R	4 4 1/2 x 5	349 9	3 06-1	Wisconsin	I. Helical	Cent	Cent	Pressure	Gear	Remy	6	Single	Boech	Hand	Stromberg	Pressure
Sum	17	6 3 1/2 x 5	230 1	4 75-1	Own	L. Helical	Cent	Cent	Splash-Press	Piston	Remy	7	Single	Remy	Hand	Rayfield	Vacuum
Temple	445	4 3 1/2 x 5	196 8	4 45-1	Own	I. Chain	Cent	Cent	Pressure	Gear	Remy	6	Single	Remy	Hand	Zenith	Vacuum
Temple	645	6 3 1/2 x 5	212 0	4 45-1	Own	I. Chain	Cent	Cent	Pressure	Gear	Remy	6	Single	Remy	Hand	Zenith	Vacuum
Valve-Biltwell	28	6 3 1/2 x 4	224 0	4 33-1	Continent	L. Helical	Cent	Cent	Splash-Press	Piston	Remy	6	Single	Remy	Atmte	Stromberg	Vacuum
Valve-Biltwell	27	6 3 1/2 x 5	303 1	4 08-1	Continent	L. Helical	Cent	Cent	Splash-Press	Piston	Remy	6	Single	Remy	Atmte	Stromberg	Vacuum
Westcott	S-17	6 3 1/2 x 5	303 1	4 45-1	Continent	L. Helical	Cent	Cent	Splash-Press	Piston	Delco	6	Single	Delco	H&A	Rayfield	Vacuum
White	16 Valve Four	4 4 1/2 x 5	326 3		Own		Helical	Cent	Pressure	Gear	Leeco-N.	12	Single	{Siemann Boech}	Hand	Own	Vacuum
Willys-Knight	68-4	4 4 1/2 x 4	240 5	4 30-1	Own	I. Chain	Ther	Ther	Splash-Press	Piston	Auto-Lite	6	Single	Conn.	Hand	Tillotson	Vacuum
Willys-Knight	68-8	5 1 1/2 x 4	343 8	4 6-1	Own	I. Chain	Ther	Ther	Pressure	Piston	Auto-Lite	6	Single	H&A	Hand	Zenith	Vacuum
Willys	68-6	6 3 1/2 x 5	303 1	4 00-1	Continent	L. Helical	Cent	Cent	Splash-Press	Piston	Auto-Lite	6	Single	Conn.	Hand	Tillotson	Vacuum
Winton	33	6 3 1/2 x 5	147 9	4 45-1	Own	L. Chain	Cent	Cent	Pressure	Piston	Bijur	6	Single	Boech	Hand	Rayfield	Vacuum
Winton	48	6 3 1/2 x 5	524 8	4 08-1	Own	L. Chain	Cent	Cent	Pressure	Piston	Bijur	6	Single	Boech	Hand	Rayfield	Vacuum
Woods Dual Power	1000	4 2 1/2 x 3	68 7	4 25-1	Special	L. Helical	Ther	Ther	Circ-Spl	Gear			Single	At Kent	Atmte	Zephyr	Gravity
Yale		8 1 1/2 x 4	276 1	4 45-1	Maso-Ph	Chain	Ther	Ther	Circ-Spl		Duco	6	Single	Remy	Hand	Rayfield	Vacuum

ABBREVIATIONS: Make of Engine: Continental, Continet, Hersh-Sp, Golden, Belknap & Swartz, G.B.&S., Massach-Pilgr, Mass-Ph. Cylinder Shape: I-Head, L-Head, T-Head, T. Camshaft Drive: Spur Gear, Spur. Water Circulation: Centrifugal, Cent. Thermo-siphon Ther. Lubrication System: Splash-Pressure, Splash-Press, Circulating-Splash, Circ-Spl. Oil Pump Type: Impeller, Imp. Electric System: Ward Leonard, Ward-L, Gray & Davis, G & D, Allis-Chalmers, Allis-Ch, Leeco-Nerille, Leeco-N. Ignition System: Dual-Double, Dual-D. Ignition Make: Atwater Kent, At Kent, Ignition Control: Hand and Automatic, H&A; Automatic, Atmte. Make of Carburetor: Bosch, Bosch, Reichh, Longmarch, Longmarch. Clutch Type: Multiple Disk, Mul-D. Gearset Type: Selective, Sel, Planetary, Plan; Friction, Fric. Gearset Location: Unit with Motor, Unit M; Unit with Axle, Unit X; Amidship, Amid, Unit with Torque Tube, Unit T. Final Drive: Spiral

Carbureters, Crankers, Magnetos, Etc. for 1917—Continued

Clutch Type	TRANSMISSION							RUNNING GEAR					Make of Speedometer	Crankshaft Bearings	Number	BEARINGS			MAKE AND MODEL		
	GEARSET			Car Drives Through	Rear Axle Type	Make of Rear Axle	Torque Taken By	Wheels	TIRES		Wheels	Rear Springs				Gearset	Rear Axle	Front Wheel			
	Type	Location	Forward Sp'ds						Final Drive	Front										Rear	
Disk	Sel.	Unit M.	3	Sp.B	Spring	Semi-F	Own	Tor.A	126 135	35x5	35x5	Wood		Waltham	Plain	3	B&R.	Hall	Roll	Packard	2-25, 2-35
Disk	Sel.	Unit M.	3	Sp.B	Tor.T	Float	Salisbury	Tor.T	117 127	32x4 35x4	32x4 35x4	Wood	Cast	Stewart	Plain	3	B&R.	B&R.	Hall	Paisley Fleetwood	6-35
Disk	Sel.	Unit X	3	Bevel	Tor.T	Float	Durston	Tor.T	96 110	30x3 32x3	30x3 32x3	Wood	Ell	None	Plain	2	Ball	Ball	Ball	Partin-Palmer	30
Cone	Sel.	Unit M.	3	Sp.B	Spring	Float	Hess	Spring	117	32x4	32x4	Wood	Ell	Stewart	Plain	3	Ball	Roll	Ball	Partin-Palmer	32
Disk	Sel.	Unit M.	3	Sp.B	Tor.A	Float	American	Tor.T	130 143	35x5	35x5	Wire	Ell	Stewart	Plain	3	Roll	Roll	Roll	Pethinder	2B-TC-2C
Disk	Sel.	Unit M.	3	Sp.B	Spring	Semi-F	Timken	Spring	125	35x4	35x4	Wood	Flat		Plain	3	B&R.	Roll	Roll	Pethinder	3B
Disk	Sel.	Amid.	4	Sp.B	Rad.Rd	Float		Rad.Rd		32x4	32x4	Opt.	Cast	Warner	Plain	3	Ball	Roll	Roll	Pearless	50
Cone	Sel.	Amid	4	Sp.B	Spring	Semi-F	Own	Tor.T	134	36x4	36x4	Wood	Ell	Stewart	Plain	7	B&P	B&R.	Roll	Phisena	M
Cone	Sel.	Amid	4	Sp.B	Spring	Semi-F	Own	Tor.T	142	37x5	37x5	Wood	Ell	Stewart	Plain	7	B&P	B&R.	Roll	Pierce-Arrow	3B-C-4
Cone	Sel.	Amid	4	Sp.B	Spring	Semi-F	Own	Tor.T	147	38x5	38x5	Wood	Ell	Stewart	Plain	7	B&P	B&R.	Roll	Pierce-Arrow	4B-3-4
Plate	Sel.	Unit M.	3	Sp.B	Spring	Float	Hess	Tor.T	119	32x4	32x4	Wood	Cast	Stewart	Plain	3	Ball	B&R.	Roll	Pilot	6-45
Plate	Sel.	Unit M.	3	Sp.B	Spring	Semi-F	Timken	Spring	125	35x4	35x4	Wood	S-E	Warner	Plain	3	B&P	Roll	Roll	Premier	6-8
Disk	Sel.	Unit M.	3	Sp.B	Spring	Float	Own	Spring	108	32x3	32x3	Wood	Ell		Plain	3	B&R.	B&R.	Ball	Princeton	4-38-F
Disk	Sel.	Unit M.	3	Bevel	Spring	Float	Peru	Tor.T	114	31x4	31x4	Wood	Cast	Stewart	Plain	3	Ball	Roll	Roll	Pullman	424-32
Cone	Sel.	Unit M.	3	Bevel	Tor.T	Float	Peru	Tor.T	104 115	30x3 33x4	30x3 33x4	Wood	Cast	Stewart	Plain	3	Ball	Roll	Roll	Regal	F
Disk	Sel.	Amid	3	Sp.B	Spring	Semi-F	Own	Tor.A	115 126	34x4 34x4	34x4 34x4	Wood	Ell	Stewart	Plain	3	Roll	Roll	Roll	Regal	F
Cone	Sel.	Unit M.	3	Sp.B	Spring	Float	Own	Spring	124	35x4	35x4	Wood	S-E		Plain	3	Ball	Ball	Roll	Rex	M
Plate	Sel.	Unit M.	3	Sp.B	Spring	Float	Hess	Spring	124	34x4	34x4	Wire	Ell	Warner	Plain	3	Ball	Ball	Ball	Richmond	6-17
Disk	Sel.	Unit M.	3	Sp.B	Spring	Float	American	Tor.T	130	35x4	35x4	Wood	Ell		Plain	3	Ball	Ball	Ball	Roemer	
Disk	Sel.	Unit X	3	Bevel	Tor.T	Semi-F	Timken	Tor.T	96 112	30x3 32x3	30x3 32x3	Wood	Cast	Standard	Plain	2	B&P	B&R	Roll	Ross	C
Disk	Sel.	Unit X	3	Sp.B	Tor.T	Semi-F	Timken	Tor.T	112	32x3	32x3	Wood	Cast	John-Man	Plain	3	B&P	Roll	Roll	Saxon	B-5-R
Disk	Sel.	Unit M.	3	Sp.B	Spring	Float	Russell	Rad.Rd	120	32x4	32x4	Wire	Cast	Stewart	Plain	2	B&P	B&R.	Hall	Saxon	3-4
Disk	Sel.	Unit M.	3	Sp.B	Spring	Float	Own	Spring	143	38x4	37x5	Wood	S-E		Plain	3	Ball	Ball	Roll	Scripps-Booth	D
Disk	Sel.	Unit M.	4	Sp.B	Spring	Float	Timken	Spring	136	35x5	35x5	Wire	Cast	Warner	Plain	3	Ball	Roll	Roll	Simplex	
Plate	Sel.	Unit M.	3	Sp.B	Spring	Semi-F	Timken	Spring	127	35x4	35x4	Wood	S-E	Stewart	Plain	3	B&R.	B&R&P	Roll	Singer	17
Disk	Sel.	Unit M.	3	Sp.B	Spring	Semi-F	Timken	Spring	127	35x4	35x4	Wood	S-E	Stewart	Plain	3	B&R.	B&R&P	Roll	Standard	E
Disk	Sel.	Unit M.	3	Sp.B	Spring	Semi-F	Own	Spring	119	34x4	34x4	Opt	Cast	Stewart	Plain	3	B&R.	B&R	Ball	Standard	F
Disk	Sel.	Unit M.	3	Sp.B	Spring	Semi-F	Own	Spring	123	35x4	35x4	Opt	Cast	Stewart	Plain	3	B&R.	B&R	Ball	Stearns Knight	SK14-32
Disk	Sel.	Unit M.	3	Bevel	Spring	Float	Hess	Spring	115	32x4	32x4	Wood	S-E	Stewart	Plain	3	Ball	Roll	Roll	Stearns Knight	SK3-33
Cone	Sel.	Unit X	3	Bevel	Rad.Rd	Float	Own	Tor.A	112	34x4	34x4	Wood	Ell	Stewart	Plain	3	Roll	Roll	Roll	Stephens	80-45
Cone	Sel.	Unit X	3	Bevel	Rad.Rd	Float	Own	Tor.A	122	34x4	34x4	Wood	Ell	Stewart	Plain	3	Roll	Roll	Roll	Studebaker	3F4-40
Cone	Sel.	Unit X	3	Bevel	Tor.T	Float	Own	Rad.Rd	130	34x4	34x4	Wire	S-E		Plain	3	Ball	Ball	Roll	Studebaker	ED6-50
Plate	Sel.	Unit M.	3	Sp.B	Spring	Float	Hess	Spring	116	34x4	34x4	Wood	S-E	Stewart	Plain	3	Ball	B&R.	Ball	Stutz	R
Plate	Sel.	Unit M.	3	Sp.B	Spring	Semi-F		Spring	120	32x4	32x4	Opt	Ell		Plain	3	Ball	Roll	Roll	Sum	17
Plate	Sel.	Unit M.	3	Sp.B	Spring	Semi-F		Spring	120	32x4	32x4	Opt	Ell		Plain	3	Ball	Roll	Roll	Templar	445
Plate	Sel.	Unit M.	3	Sp.B	Spring	Semi-F	Timken	Spring	115	32x4	32x4	Opt	Ell	Stewart	Plain	3	B&P	Roll	Roll	Templar	445
Plate	Sel.	Unit M.	3	Sp.B	Spring	Semi-F	Timken	Spring	124	35x4	35x4	Opt	Ell	Stewart	Plain	3	B&P	Roll	Roll	Volvo Boltwell	26
Disk	Sel.	Unit M.	3	Sp.B	Spring	Semi-F	Timken	Tor.T	125	35x4	35x4	Wood	Cast	Warner	Plain	3	B&R.	Hall	Roll	Volvo Boltwell	27
Plate	Sel.	Unit M.	4	Sp.B	Spring	Semi-F	Own	Spring	137	37x5	37x5	Wood	S-E		Plain	3	Ball	Hall	Roll	Westcott	5-17
Cone	Sel.	Unit X	3	Sp.B	Tor.T	Float	Own	Tor.T	121	34x4	34x4	Wood	Cast	Stewart	Plain	3	B&R.	Roll	Roll	White	16 Valve Four
Cone	Sel.	Unit A	3	Sp.B	Tor.T	Float	Own	Tor.T	125	34x4	34x4	Wood	Cast	Stewart	Plain	2	B&R.	Roll	Roll	Willys-Knight	85-4
Cone	Sel.	Unit X	3	Sp.B	Tor.T	Float	Own	Tor.T	125	35x4	35x4	Wood	Cast	Stewart	Plain	3	B&R.	Roll	Roll	Willys-Knight	86-8
Disk	Sel.	Unit M.	4	Sp.B	Spring	Float	Own	Tor.T	124	36x4	36x4	Wood	Ell		Plain	4	B&R.	Roll	Roll	Willys	86-4
Disk	Sel.	Unit M.	4	Sp.B	Spring	Float	Own	Tor.T	134	37x5	37x5	Wood	Ell		Plain	4	B&R.	Roll	Roll	Winton	33
Mag				B-Worm	Spring	Semi-F	Own	Tor.A	110	34x4	34x4	Wood	Cast		Plain	2		Roll	Roll	Winton	40
Disk	Sel.	Unit M.	3	Bevel	Spring	Semi-F	Timken	Spring	126			Wood	Ell	Stewart	Plain	2	Ball	Roll	Roll	Woods Dual Power	
Disk	Sel.	Unit M.	3	Bevel	Spring	Semi-F	Timken	Spring	126			Wood	Ell	Stewart	Plain	2	Ball	Roll	Roll	Yale	

Bevel, Sp.B. Car Drives Through: Radius Rods, Rad.Rd, Torque Tube, Tor.T, Torque Arm, Tor.A. Rear Axle: Floating, Float; Semi-Floating, Semi-F; Three-quarter Floating, 3/4 Float. Make of Axle: Weston-Mott, West M; Walker-Weston, W.Weston. Rear Springs: Elliptic, Ell; Three-quarter Elliptic, 3/4 Ell; Semi-Elliptic, S-E; Cantilever, Cant; Platform, Plat. Transverse Semi-Elliptic, Tr-S-E. Bearings: Roller, Roll; Ball and Roller, B&R; Ball and Plain, B&P; Ball, Roller and Plain, B&R&P. Cup and Cone, C&C. Make of Speedometer: John-Manville, John-Man. Fuel Feed: Stewart Vacuum Tank, Vacuum.

*Wire special equipment. †Wood optional.

The Car Digest

A Model-by-Model Resume of Improvements in 1917 Cars

Grouped According to Number of Cylinders and
Arranged Alphabetically

FOUR—Page 82			SIXES—Page 90			EIGHTS—Page 100		TWELVES—Page 102	
Aland	Elcar	Monitor	Abbott	Glide	Mitchell	Sun	Westcott	Austin	National
Allen	Emerson	Monroe	American	Grant	Monitor	Templar	Willis	Enger	Pathfinder
Ams Sterling	Empire	Moore	Anderson	Harvard	Moon	Velle	Winton	HAL	
Arbenz	Fiat	Napoleon	Apperson	Haynes	National	Apperson	Majestic	Haynes	
Bell	Ford	Overland	Auburn	Hollier	Oakland	Cadillac	Murray		
Biddle	F.R.P.	Partin-Palmer	Ben-Hur	Howard	Ogren	Chevrolet	Oakland		
Brewster	Hackett	Phaenna	Bour-Davis	Hudson	Overland	Cole	Oldsmobile		
Briscoe	Harroun	Princess	Buick	Jeffery	Owen Magnetic	Cunningham	Peerless		
Brunswick	Hatfield	Pullman	Cammer	Jones	Palge	Daniels	Regal		
Buick	Hupmobile	Regal	Chalmers	Jordan	Paterson	Drummond	Ross		
Case	Inter-State	Reo	Chandler	Klinekar	Pierce-Arrow	Hollier	Scripps-Booth		
Chevrolet	Jeffery	Richmond	Charter Oak	Lambert	Pilot	Holmer-Laughlin	Standard		
Classic	Kent	Saxon	Chicago	Lexington	Premier	Jackson	Stearns		
Crow-Elkhart	Lambert	Stearns	Columbia	Liberty	Ras	King	Yale		
Crowther	Laurel	Studebaker	Davis	Locomobile	Richmond				
Dispatch	Malbohm	Stutz	Detroit	Louverne	Roadster				
Dixie Flyer	Maxwell	Templar	Dorris	Madison	Saxon				
Dodge	Mercer	White	Elgin	Marmon	Simplex				
Dort	Metz	Willya-Knight	Empire	Marion-Handley	Singer				
Drexel	Moline-Knight	Woods	Franklin	McFarlan	Studebaker				

The Four-Cylinder Cars

Aland

THE Aland is one of three cars announced this season in which a sixteen-valve, four-cylinder motor is used. Hand in hand with the modernity of the sixteen-valve construction is the feature of design of keeping the weight of the car as low as possible throughout. This is gained a good deal by the use of high tensile strength steel. The cylinders are cast in a single block and carried to the crankcase as an integral part. This is an aluminum casting and the cylinder walls are provided with cast iron sleeves, which are pressed into place. An aluminum alloy casting is also used for the cylinder heads and pistons.

Aland Motor Car Co., Detroit, Mich.

Allen

THE latest Allen offerings are found in a convertible sedan and a convertible coupe. The coupe is a completely furnished three-passenger inclosed car. The coupe is upholstered in heavy all-wool gray whipcord. Interior trimming is of gray broadlace with silk curtains. The interiors are lighted by dome lights placed in the center.

In the sedan there is a space of 6 in. between the rear seat and the back of the top, which affords women occupants an opportunity to lean back comfortably in the seat without crushing their hats, a feature which is readily appreciated. The

sedan seats five and the front seats are divided into a roomy passage way. In this model the cushions are covered with gray Spanish Imperial upholstery.

Allen Motor Co., Postoria, Ohio

Arbenz

THE new Arbenz 25 is a low-priced vehicle for one of its size and the equipment it carries. It has a long stroke motor and has full cantilever suspension in the rear of unique design. It is not much changed from last year.

Arbenz Motor Co., Chillicothe, Ohio

Briscoe

THE 1917 Briscoe is a very new car in practically every detail. The body design is particularly interesting. Following the latest practice, it has a high narrow radiator and a sloping hood and body. There is no transitory curve where the hood joins the body. The slanted windshield gives an added touch to the appearance of speed and power. The motor has a comparatively long stroke, having a stroke-bore ratio which is somewhat greater than the average.

Drive of the generator is unusual, as it is from the rear end of the camshaft through gear connections. The clutch also varies from average practice principally in the fact that it is of the inverted type, that instead of pulling back from the motor to release, it is shoved toward the cyl-

inders. It is the leather-faced cone type. In the clover-leaf model there is an upholstered door between the divided front seats which closes the rear compartment off or opens the aisleway as one wishes.

Briscoe Motor Corp., Jackson, Mich.

Brewster

ALTHOUGH Brewster & Co. has done a high-class coach work since 1810 and has built some of the finest custom motor car bodies in recent years, it enters for the first time into the construction of a complete car. It can well be imagined that these cars are of high price, the lowest-priced model selling for \$2200 and the highest for \$2300. The very carefully constructed chassis embodies a four-cylinder Knight motor with a 4-in. bore and a 5½-in. stroke, Zenith carbureter, Bosch ignition and other standard makes of parts of a like caliber. An interesting feature of the construction is the spring suspension of huge cantilevers. Custom-built bodies of all types are offered.

Brewster & Co., New York

Brown

IN introducing its new product of passenger cars, the Brown makers do not claim them to be creations of a corps of engineers but instead that the machines are made up of assembled parts constructed by capable and well known manufacturers in the motor car line. In matters

of equipment the motor is a stock model LeRoy. The electrical system includes an Atwater-Kent distributor fed from a U. S. L. storage battery which is in turn fed from an Allis-Chalmers motor generator. Carburetion is supplied through a Kingston float feed instrument, the rear axles are Walker & Weiss make with Hyatt bearings and Batavia or U. S. tires are offered as optional.

Brown Carriage Co., Cincinnati, Ohio

Buick

AFTER a few seasons of sixes only, Buick again has gone back to the light-weight four. This new car follows characteristic Buick designs throughout with perhaps more alterations in the motor than elsewhere although that unit is a valve-in-the-head type as are all power plants of this make.

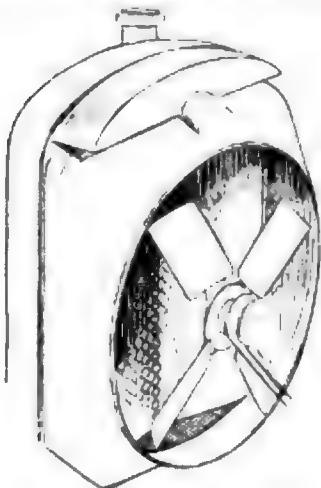
In its general lines, specially the radiator, the new car is typically Buick. It has a wheelbase of 106 in. and there is plenty of room for five passengers.

Specifications of interest are pump cooling, Marvel carburetor in conjunction with rear tank and Stewart vacuum feed, Delco starting, lighting and ignition, cone clutch, three-speed gearset in unit with the engine, drive shaft inclosed within a torsion tube, three-quarter floating axle, semi-elliptic springs both front and rear and 31 by 4-in. non-skid tires all around. This is the first Buick motor in which the cylinder head is detachable as a unit with the valves. In the design of the cylinder head, special provision has been made for proper cooling of the valves, the water passages surrounding the pockets being of good size.

Buick Motor Co., Flint, Mich.

Case

THE new Case, which makes its debut at the New York show, has several changes designed to add to the mechanical efficiency and alterations to increase the comfort and convenience of the passengers,



Sheet metal shell on Buick Davis to concentrate cooling effect of fan

with body changes which make the car a more beautiful assembly.

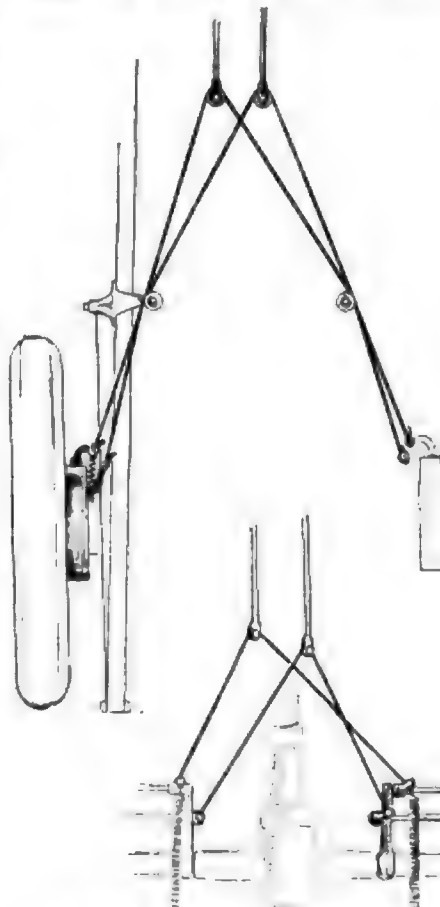
This year's motor has been simplified by elimination of the cross shaft used for generator drive. The camshaft chain drive of a year ago is replaced by helical timing gears of special material which, in connection with roller push rods and inclosed valves, make for noiseless operation. Changes of note in the chassis are found in the rear axle and cooling system. The former is now a three-quarter floating type and the radiator, which last season was cellular, is now a vertical tube design, manufactured in the Case shop. The two-blade fan has been replaced by one with six blades.

A change appears in the starting, lighting and ignition system. An Auto-Light generator has been installed and ignition is supplied by a Connecticut distributor fed by a Willard storage battery. Body changes make for more artistic lines, the characteristic Case shape being maintained.

J. J. Case T. M. Co., Racine, Wis.

Chevrolet

THE new Chevrolet 4-90 is an improvement over its predecessor in several respects. The car is better looking and more comfortable. The body has been changed so that it is more streamline



Two brake connections. The one above shows that of the Distributor and the one below is of the Maybach

and a door is now carried on the driver's side. Last year there were but three doors.

Tires have been increased from 30 by 3 to 30 by 3½, and Goodyear non-skids instead of plain tread are fitted. A sight-feed oiler and indicator has been placed on the cowl and the horn button has been attached to the steering post, instead of on the body side. Three-quarter elliptics are used at the front.

Chevrolet Motor Car Co., Flint, Mich.

Classic

THE Classic is a newcomer selling for \$895. The body is a roomy seven-passenger type of advance 1917 design and is mounted on a 114-in. wheelbase chassis. There are flush doors with concealed hinges and flush type upholstery without heading. The car has an unusually complete complement of equipment in accessories for one in this price.

Classic Motor Car Corp., Chicago

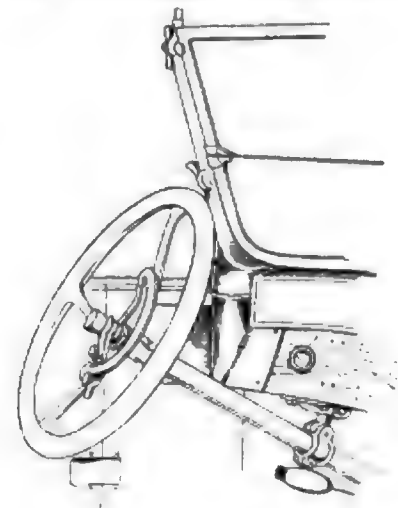
Crow-Elkhart

THE two Crow models, one a five-passenger touring and the other a three-passenger cloverleaf, are considerably different in exterior appearance. The body with the most striking appearance is the cloverleaf roadster which has a boat-shaped rear, a V radiator, and a distinct line from the radiator to the cowl. Wire wheels are standard equipment on this model. Both bodies contain more roominess than was found in previous cars offered by this company. Chassis principles of the car remain fundamentally the same as they have been for the past eight years.

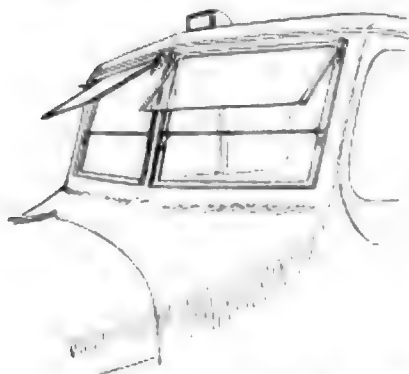
Crow Motor Car Co., Elkhart, Ind.

Crowther

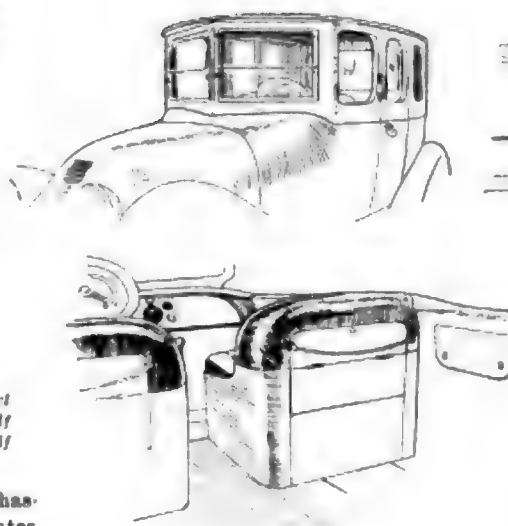
CHARLES E. DURYEA, pioneer motor car builder, has designed another car, which is being marketed under the Crow-



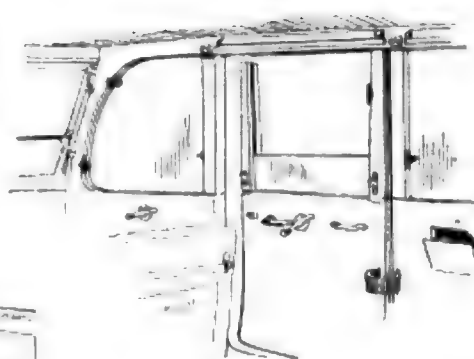
The Standard eight uses a reinforcing plate to support the windshield. There also is a special clamp to make the steering column more rigid



The Paige touring sedan has a novel windshield. It is in two parts, and half of it may be opened while the other half is closed



Franklin sedan, shown above, has a windshield that is somewhat like the Paige, shown on the left. Below is shown the spacious aisle between the front seats of the National. Note how the upholstery comes far over the backs of the front seats



The interior of the Paige sedan bespeaks luxury. Note how the glass in the front window conforms to the bias windshield

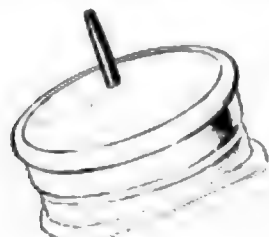
ther name. Its features are unusual chassis simplicity and a gearset which operates within the rear wheels, engagement of the gears being brought about by swinging the jack shaft in swing bearings and bringing different-sized gears into play. Because of this jackshaft construction, the rear axle is naturally a dead axle. The jackshaft is supported on side members extending from the rear axle to the frame which also serve to take up the torque. The car has no differential.

Crowther Motors Co., Rochester, N. Y.

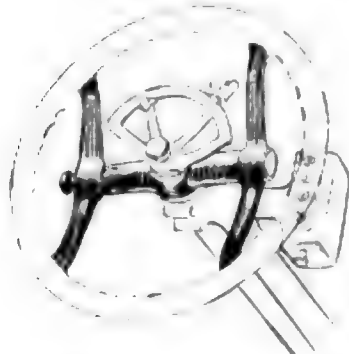
Cummins-Monitor

THIS concern has been assembling and manufacturing two models for the last year and they will be continued with slight changes. They are the four-cylinder priced at \$795 and the six-cylinder priced at \$995.

Cummins-Monitor Co., Columbus, Ohio



Chalmers has a new type of filler for the gasoline tank which has an air spout that prevents slopping



Premier employs a tilting steering wheel which gives easy entrance for the driver

Dixie

A FOUR-PASSENGER roadster with a cloverleaf seating arrangement is the newest thing in Dixie body styles. A little nicety in the equipment is an auxiliary cover of packer cloth which fastens with glove fasteners to the bows when the top is lowered, completely concealing the rear compartment. The motor is a four-cylinder, L-head, Lycoming of conventional design. Rear axle in the Dixie is a floating type, drive to the rear wheels transmitted from the drive-shaft by a jaw clutch. Dixie was one of the first to embody a flexible disk clutch, and this feature is retained in the 1917 chassis.

Dixie Motor Car Co., Louisville, Ky.

Dodge

ALTHOUGH Dodge does not announce yearly models, a number of changes have appeared in these cars within the last 2 or 3 months. Notable among these are the addition of a convertible sedan of a type which permits lowering of the windows for summer driving.

Changes in mechanical parts of the car are in the installation of a multiple-disk clutch in place of a cone clutch and spiral-bevel gears in the rear axle in place of straight bevels. The brake drums have been increased in size. Another change is found in single wiring in the starting system instead of double wiring. This affects the starting system only.

The appearance of the body has been improved by a height increase of 2 in. in the radiator and hood. There is now a mud apron on the front and the front fenders have been improved, these being stamped out of one piece of sheet steel.

Dodge Bros., Detroit, Mich.

Dort

THERE have been no changes in the Dort models which were announced for 1916 production. It is not the intention of this company to bring out yearly models, but simply to add from time to time such changes as are considered advisable or to the best interest of its customers. The car is a conventional four-cylinder model of light weight, and has economy as one of its big talking points.

In bodies there are to be found three new styles. These are the sedan, the sedanet and the four-de-lys roadster. The inclosed models are striking in design, having rain-vision windshields, divided front seats and a complete closed-car equipment.

Dort Motor Car Co., Flint, Mich.

Drexel

DREXEL is the fourth manufacturer to announce a sixteen-valve four-cylinder car. The motor, which is the design of A. J. Farmer, formerly of General Motors, has a 3 1/4-in. bore and 5-in. stroke with turning possibilities of 3400 r.p.m., so it is claimed. In the equipment is found Stromberg carbureter, Bosch magneto, Bijur two-unit starting and lighting system, floating axles, and a 112-in. wheelbase. The selling price is \$855.

Drexel Motor Car Co., Chicago

Elcar

THE Elcar for the coming season will be furnished in five-passenger touring car, four-passenger touring roadster and a two-passenger roadster designated as models D, E and F, all on the same chassis. The chassis is quite different from that of 1916.

The wheelbase has been increased to 115 inches and the design of the frame itself is different. The cone clutch is replaced with a dry-disk type and the position of the gearshift and emergency brake levers is such as to be more convenient for the driver. The new spring suspension is semi-elliptic front and rear and spiral bevel

gears are used and a new floating axle with roller bearings at each end of the wheel hubs.

Elkhart Carriage and Motor Car Co., Elkhart, Ind.

Emerson

THE Emerson four is a completely equipped five-passenger car selling at \$395. Features probably never before found in a car of such low price are the electric lighting equipment, stream line body with double cowl, slanting windshield and a 110-in. wheelbase. The body lines of the car conform with modern practice.

Emerson Motors Co., Inc., New York, N. Y.

Fiat

CHARACTERIZED by an usually large bore and long stroke, the four-cylinder Fiat has a displacement that is probably the largest of all American fours and only exceeded by two other cars, those having six cylinders. The bore is 5½ and the stroke 6¾. This gives a displacement of 557 cu. in. and the high power makes possible a high-gear ratio of 2¾ to 1 on touring models and 3 to 1 on the limousine. The Fiat is a strictly high-priced car, the touring car selling for \$5500 and the limousine for \$6500. Naturally the options offered are numerous.

F.I.A.T. CO., Poughkeepsie, N. Y.

Ford

THE Ford changes of 1917 production outside of the startling announcement of price decrease which is well known, is in the external appearance. These changes include the fitting of an entirely new radiator of black enamel with rounded corners instead of the sharp angles that it used previously. This radiator has a smaller water capacity and for this reason is thinner than the previous one and this is compensated by the fact that the fan operates in a bell shaped shell attached to the rear of the radiator which is made of sheet metal. This concentrates the cooling effect of the fan. There is a new sloping hood that eliminates any

break where it joins the body and crown fenders which conform to the curve of the wheels in most modern fashion are installed front and rear.

A minor change under the hood is the fitting of an electric horn mounted on the right rear side of the cylinders between them and the steering column. The horn is of the vibrator type and is arranged to operate from the current of the flywheel magneto and the button is mounted on the steering column just under the wheel.

The new radiator shell is a two-piece stamping, one the shell proper and the other the top portion that bears the Ford name plate stamped on it. The familiar Ford filler cap and radiator spout of brass protrude through the top of the shell. Now that the radiator is enameled, there is very little brass about the car, only the filler and hub caps being finished in the color of this metal.

Ford Motor Car Co., Detroit, Mich.

F. R. P.

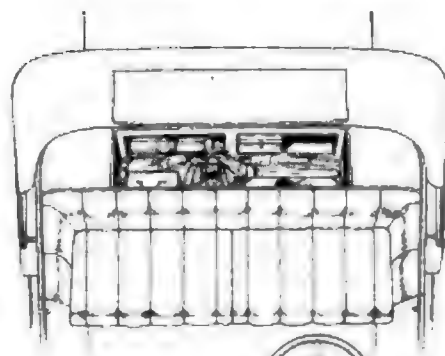
THE model 45 F. R. P. series A, B and C cars are being continued with some changes. Noticeable among these changes is the cone clutch which is being abandoned in favor of a special Hele-Shaw clutch and the motor which is being changed from eight valves to sixteen. There is also being added a model 35 which will be furnished in three series, a two-passenger, a five-passenger and a close-coupled four-passenger job. The same construction throughout will be used in this model except for the motor size.

Finley Robertson Porter Co., Inc., Port Jefferson Station, L. I., N. Y.

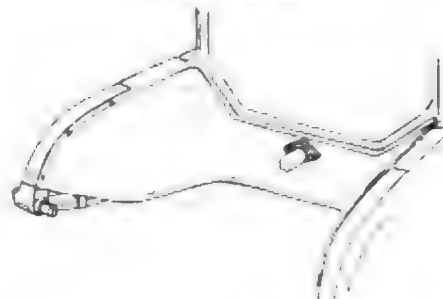
Ghent

THE new Ghent four-cylinder car is featured by a five-passenger, double cowl body of the latest improved type placed on a 120-in. wheelbase chassis and selling for \$750. The general construction of this newcomer is conventional throughout, the most noticeable innovation being the use of Parker hydraulic pressed steel wheels made under the Hugo C. Gibson patent. The lines of the body are particularly distinctive.

Ghent Motor Co., Chicago



Carrying compartment which is a feature in King Poursome



Apron in front of the Locomobile to prevent splashing

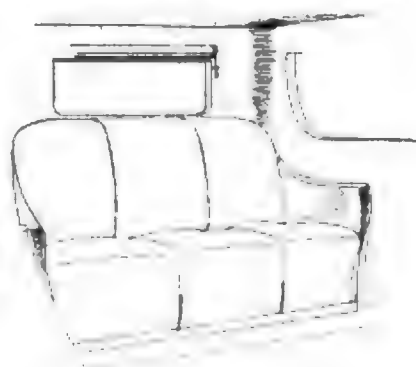
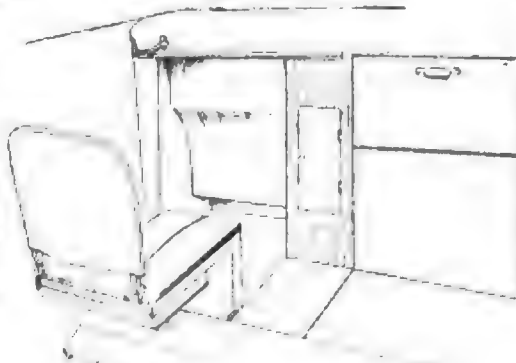
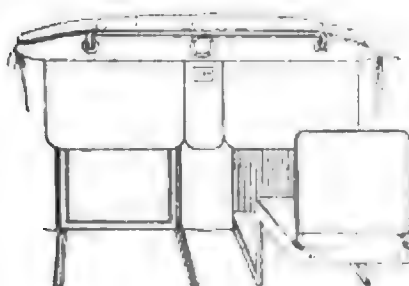
Hackett

THE Hackett made its debut but a few months ago, the first description appearing in the August 31, 1916, issue of MOTOR AGE. The originality of the body puts it in a class by itself as far as appearance is concerned. There is a straight line running from the top corners of the radiator all the way back. The effect is accentuated by the use of a narrow deck extending all around the rim of the body and also forming a double cowl on the back of the rear seat. The windshield is tilted and there are large louvers in the hood which are set at the same angle. There is a five-passenger touring, a runabout and a cabriolet.

Hackett Motor Car Co., Jackson, Mich.

Harroun

RAY Harroun's new car which bears his name was first announced in the December 21 issue of MOTOR AGE. It is a



The two views at the left show how the Locomobile and Standard eight take care of the mudguard seats. They fold into the backs of the front seats. At the right is shown the deep upholstery of the Pioneer Avenue

light four-cylinder car selling at a surprisingly low price for the features which it embodies. Briefly, the motor is of the overhead-valve type with a long bore in comparison with the stroke. The motor propels a very low hung chassis, the frame of which flares from a narrow front to the very edges of the break drums in the rear.

The oil from the motor crankcase continually circulates through a radiator, thus maintaining a low temperature.

Harroun Motors Corp., Wayne, Mich.

Harvard

THE Harvard roadster announced late in the fall has a 44-inch tread with a 100-inch wheelbase. To meet the demand of foreign trade where practically all of the product is sold. A Sterling model 20 motor is used. Atwater-Kent ignition has been adopted with a Wagner two-unit starting and lighting system. This supercedes a single-unit starting and lighting system of high voltage.

Harvard-Pioneer Motor Car Corp., Troy, N. Y.

Hatfield

THE Hatfield is built in three models, a three-passenger roadster, a suburban car and a speedster. In the suburban car, the makers have touched a new field. It is built with very low sides and express top and a rear seat which may be removed. The claim is that this model

is rugged enough to go to mill and handsome enough to go to meeting. It is designed as the ideal farmer's car.

Cortland Cart & Carriage Co., Sidney, Ohio

Hupmobile

FOR 1917 Hupp is continuing the model N which is built with the same bodies as before, namely: Five-passenger touring, five-passenger convertible, five-passenger sedan, two-passenger roadster, two-passenger convertible coupe and seven-passenger touring.

The changes in the model N from those furnished last year are all in the nature of refinements, looking to comfort and ease of operation of the owner. Neverleak material has been substituted for mohair for the summer top and curtains. The Firestone type of rim has been adopted.

Hupp Motor Car Co., Detroit, Mich.

Inter-State

ALTHOUGH the standard touring car and roadster of the Inter-State offerings remain unchanged after 3 years of standardized manufacturing, four new body designs are offered for 1917 in the form of a divided front seat touring car, a Four-Leaf Clover four-passenger roadster, a Springfield-type touring sedan, and a panel body delivery wagon of 850-lbs. carrying capacity. This makes the Inter-State product total six body designs with

no discontinuation of any 1916 models. All of the models for 1917 show a more intensified adherence to perfection of details rather than any radical changes in design or construction. Particular emphasis has been laid upon comfortable seating arrangement and to arrive at this end the Inter-State company is featuring individual attention to hand-tailored upholstery in its medium-priced cars.

Inter-State Motor Co., Muncie, Ind.

Jeffery

ALTHOUGH the prices of the Jeffery six have been increased, the fours remain for the present the same. These appear in three models, a seven-passenger touring a roadster and a seven-passenger sedan. The roll-edge feature of the body construction is new this year.

The Jeffery radiator is high and narrow, and the line from the top corner of the radiator to the rear seat is very nearly horizontal with the ground, giving the car a rakish straight-line appearance. Further enhancing this is the fact that the new bodies are considerably lower than they were in 1916 production.

In the equipment of this car is found the following: Rain vision windshield, tonneau foot rests, extra rim and carrier, electric instrument board on which are mounted speedometer, ammeter, oil-sight feed, ignition and lighting switch, and carburetor air adjustment. The headlights are equipped with small bulbs for dimming lights.

Nash Motors Co., Kenosha, Wis.

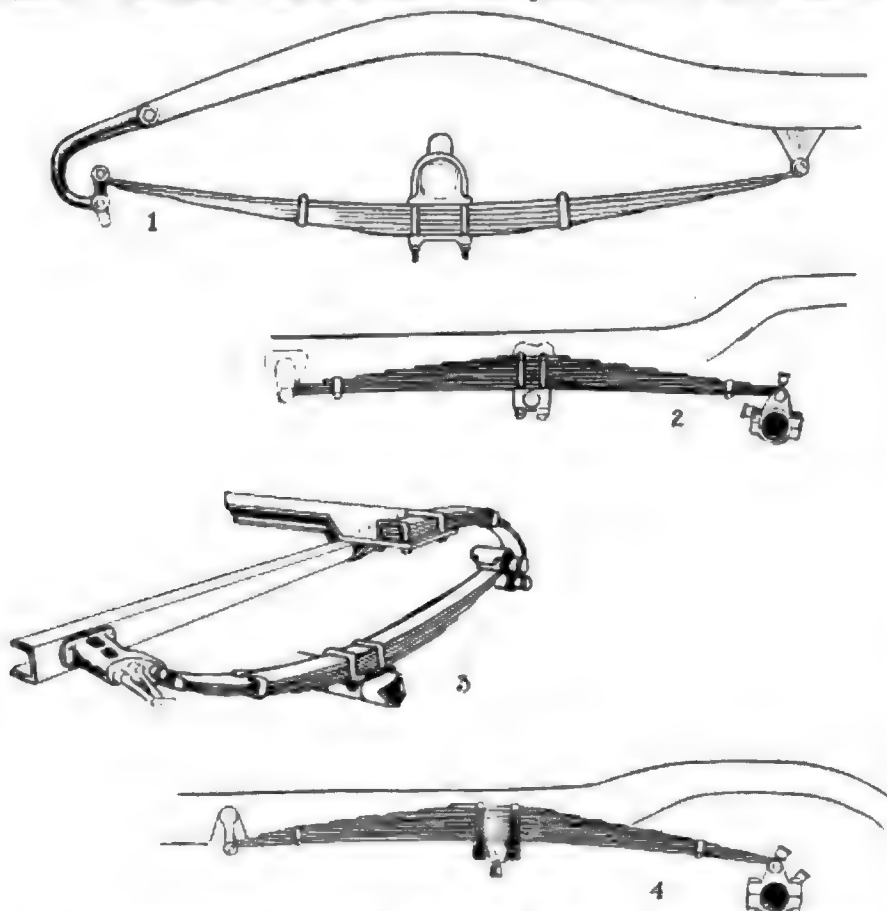
Kent

THE Kent is a newcomer in the passenger car field and is assembled from standard parts. The body lines conform with most recent accepted practice with a high, narrow radiator and unbroken lines from the top corner of the radiator to the rear of the car. The body is low hung and embodies the popular rear-compartment cowl. With a slanting windshield, a rakishly tilted wheel and a top which is horizontal when closed, the car has a massive, racy appearance.

Kent Motors Corp., Newark, N. J.

Lambert

GOING over the mechanical features of the new Lambert we find the friction drive which has characterized the car bearing the Lambert name for a number of years. This drive is conventional for this type, a patented, removable disk plate operating from the motor drive shaft onto another disk with a friction fiber facing which drives the countershaft. This countershaft in turn drives the rear axle through a chain which is inclosed in a dust-tight sheet metal case. Lightweight construction is adhered to throughout. The front springs are semi-elliptic and the rear



Four spring arrangements. 1. Haynes semi-elliptic; 2. Overland cantilever; 3. Maxwell three-quarter-elliptic, and 4. Buick cantilever

full-elliptic. An interesting feature of the motor is the cross-mounting of the centrifugal water pump and the dynamo directly behind the radiator driven by one shaft which is internal-worm-driven off of the crankshaft.

Buckeye Mfg. Co., Anderson, Ind.

Laurel

THE 1917 Laurel line will include two entirely new body designs, a five-passenger, double-cowl and a four-passenger cloverleaf roadster. Except for lengthening the wheelbase from 112 to 115 inches, the adoption of adjustable chain drive for the magneto and starter and the installation of a two-unit starting and lighting system, together with Connecticut distributor or a Dixie magneto at the option of the buyer, few changes have been made in the chassis.

Both exterior and interior finish of the four-passenger cloverleaf roadster give this body an exceptionally good appearance. The front seats are full size with ample aisle space and there is plenty of leg room for two passengers in the rear seat. Roominess marks the five-passenger, double-cowl touring body, the rear seat being 48 inches wide. Crown fenders with wide running boards will be standard features on both models.

Laurel Motor Car Co., Richmond, Ind.

Lozier

MUCH has been done to make the Lozier four as light as possible. It is made with five- and seven-passenger body and 120-in. wheelbase. It has a bore of $4\frac{1}{4}$ and a stroke of $6\frac{1}{2}$ in., the motor being of a L-head type with removable cylinder head. The frame kicks up in the rear to allow a lower center of gravity and is made narrow at the front to give a turning radius of 36 ft., 6 in.

Lozier Motor Co., Detroit, Mich.

Maibohm

IN designing this newcomer, the engineers have aimed to produce a roadster, at a thoroughly low price, which gives a speedy appearance and performance and comfortable seating. It is a low built car with deep seats having extra heavy upholstery so that the passengers sit well within the body despite the rakish exterior. For the convenience of the driver, a wide range of adjustment is provided on the pedals and the gearshift and brake levers are bent back so as to come within easy reach.

Maibohm Motors Co., Racine, Wis.

Majestic

THE new Majestic offerings are a 125-in. wheelbase model with a 3 by 5 motor, and a 135-inch wheelbase model with a $3\frac{1}{4}$ by 5-in. motor. The appearance of the car is unusually distinctive, largely because of the rounded radiator and specially de-

signed headlights. A tilted windshield and double cowl are employed:

There is a mahogany-paneled compartment, the interior of which is large enough for several lunch boxes, dusters and other articles. The door lifts up with lock hinges forming a table so that the lunch may be comfortably eaten in the car. At the right is a compartment fitted with a vacuum bottle and cigar lighter. At the left there is a compartment containing a vacuum ice box. The tonneau also includes a woman's toilet set and a cushion foot rest.

Majestic Motor Co., New York

Maxwell

BACK in June, 1916, Maxwell startled the industry with an announcement of a reduction on all models for the 1917 product. Since that time, however, the price of material has so greatly increased that this large producer has again been obliged to step the prices up. The new figures are: \$620 for the roadster, and \$635 for the touring car.

At this particular season an unusually large share of Maxwell production is going into the cabriolets, town cars and sedans. These small inclosed models are artistically furnished in the interior and the lines of the exterior give the car the appearance of being of considerably larger size than it really is.

The 1917 Maxwell is not changed. The

management believes the car to be standardized and for the present will not alter the product in any way. The chassis has a 102-in. wheelbase and is powered with the familiar block-cast cylinder type of motor with $3\frac{1}{4}$ -in. bore and $4\frac{1}{2}$ -in. stroke.

Maxwell Motor Co., Detroit, Mich.

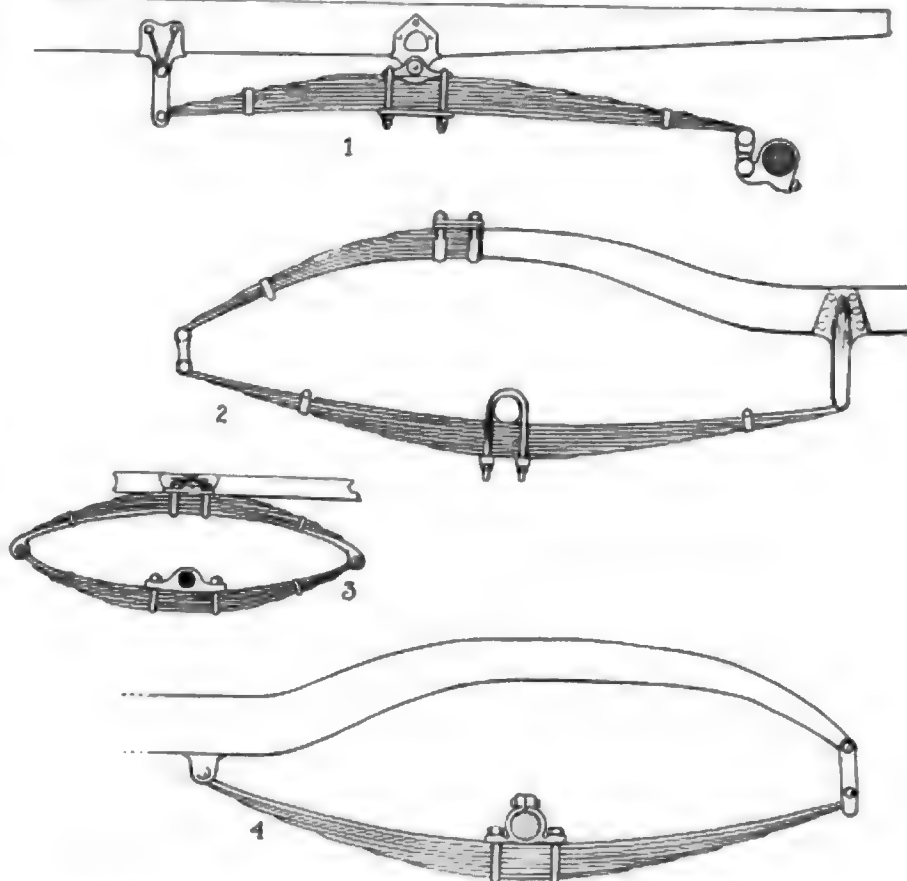
Mercer

LITTLE needs to be said of the mechanical ability of the Mercer 22-73, which is a continuation of the 1916 model 22-72. Accessibility stands out all over the powerplant of this car. It is a pleasant surprise for one who has never done it before to lift the hood and view the unusually clean exterior. Of course, the Mercer is powerful and fast. Those are two reasons for the form in which it is built. Another thing one likes to look at is the Mercer body. It is long and low and of thoroughly harmonious racing lines. As a matter of mechanical performance the Mercer has shown its mettle on the speedway and road. Power comes from a long-stroke, extreme high-speed type of motor capable of 3800 r.p.m.

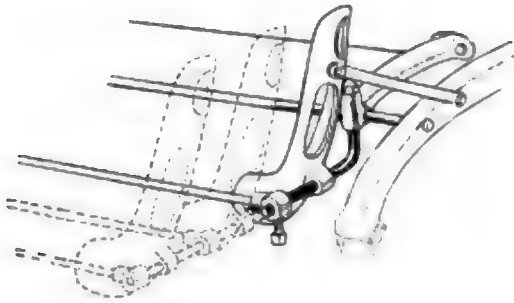
Mercer Automobile Co., Trenton, N. J.

Metz

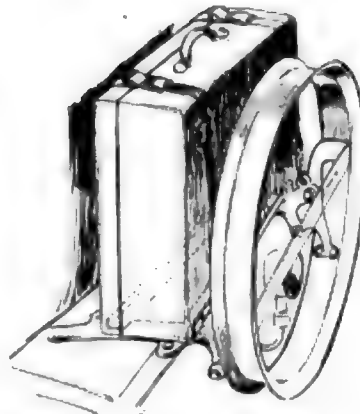
THE new Metz, although reduced in price is a manifestly improved car. The models contain no radical changes but have been improved in appearance and have received small refinements of a mechanical



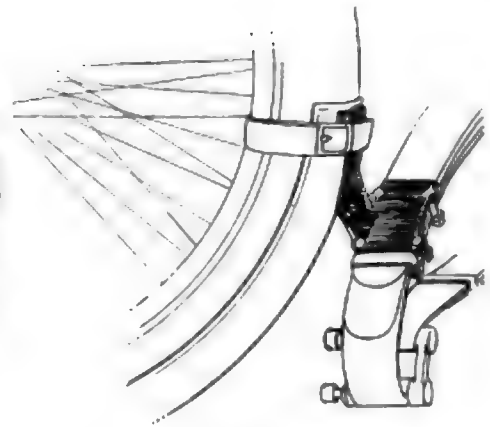
Four spring arrangements. 1. Grant six cantilever; 2. Laingston three quarter elliptic; 3. Briscoe full elliptic; and 4. Oakland semi-elliptic.



Auburn employs a tire-carrying bracket with one attachment to handle a single tire as standard equipment. Additional attachments can be obtained if desired



Bour-Davis has a combined trunk and tire carrier that comes as standard equipment. Note that the bracket that holds the tire also holds the trunk



Roamer has a special bracket that acts both as a spring clamp and a holder for the spare wheel. The method of attachment is shown above

nature. The friction form of transmission is retained without material change. In regard to the mechanical changes, the reciprocating parts of the motor have been lightened and that is the only change of importance that has been made. There is a new ventilating hood and a metal-covered windshield, black enameled, in place of the leather-covered board of the previous model. The steering column brackets have been strengthened and a light has been placed on the instrument board. Pockets are now a part of the rear seat doors.

Metz Co., Waltham, Mass.

Moline-Knight

INCREASED power with a reduction in weight features the latest Moline-Knight model. The motor has the same bore and stroke as the model 50, which was the large car of last year, but a much lighter frame and body has been fitted thus reducing the weight so that the same motor power has less to pull. The most noticeable exterior change in the motor is the substitution of a Connecticut distributor in place of the magneto in the previous model. The silent-chain system for driving the cams is a two-point instead of a three-point type.

The exhaust manifold is now constructed to permit separate exit of gases from each of the cylinders. This is accomplished by use of a casting which ports to each cylinder which takes the place of the manifold which took care of two cylinders in one port. The new crankcase is built in two halves instead of one casting as in the 1916 model 50, therefore it is only necessary to remove the oil pan to permit the complete removal of all connecting rods and pistons.

A new accessory which alters another principle of design is the installation of a Stewart vacuum tank in place of the former pressure system. The new body marks Moline's acceptance of the double cowl.

Moline Automobile Co., East Moline, Ill.

Monroe

LESS than two months ago, Monroe announced its entry into the touring car field with a five-passenger, four-cylinder model with a number of new features. The new car is roomy with its 115-in. wheelbase and it embraces the latest in construction ideas especially in the frame which is the deep section design in which the mud aprons and running boards are a part of the structure.

Everything about the car is in line with the latest tendencies. The overhead valve motor, detachable cylinder head, big valves, dry plate clutch, slanting windshield and cantilever springs are exemplifications of this.

The familiar Monroe roadster is continued at an increased price and greatly improved. Chief among the changes is the adoption of an entirely new motor with a smaller bore and longer stroke than the previous model.

Monroe Motor Car Co., Pontiac, Mich.

Moore 30

THE Moore 30 is continued from last year with few changes and after January 15, the Moore Motor Co., which previously built this car will be taken over by the Moore Motor Vehicle Co. The Moore comes in one type only, a five-passenger touring car. It uses a Golden, Belnap & Swartz motor, Seebler carbureter, Dixie magneto and Disco starting and lighting. The gearset is a Grant Lees, and the rear axle is a Peru. Goodyear tires, 30 by 3½, are standard equipment.

Moore Motor Vehicle Co., Minneapolis, Minn.

Napoleon

THE Napoleon car has a four-cylinder motor which will be used in a chassis having selective gearset, disk clutch, two-unit starting and lighting, battery ignition, semi-floating rear axle, vacuum feed and cantilever rear springs.

Napoleon Auto Mfg. Co., Napoleon, Ohio

Nelson

THIS very light weight four-cylinder newcomer was described and illustrated in the Dec. 28 issue of MOTOR AGE. The designer of the car had in view the production of a light-weight vehicle economical, yet capable of carrying five passengers under adverse conditions with a quick pick-up and relative high maximum speed. In attaining this there are several unusual features which are more in line with unique locations of parts than any mechanical innovations. Interesting items in the make-up of the car are the overhead camshaft and the unit transmission assembly in which is incorporated the clutch, gearset and rear axle gears.

E. A. Nelson, Detroit, Mich.

Overland

THE new model 85 Overland six takes the place of the previous model 83. One notable change is the increased use of pressed steel to take the place of heavier castings. An example of this is in the rear axle housing. Another important alteration is in the spring suspension which is now cantilever.

The gasoline tank has been moved to the rear and a new form of rigid tire support has been incorporated. The use of a leather universal is another innovation. Riding comfort has received particular attention in this model. The body provides ample seating room for five-passengers on the 116-in. chassis. The seats in the new models have been built lower and deeper with a slight backward tilt, and the seat cushions are built on deep coil springs.

A departure for the Overland company is the abandonment of magneto ignition and the use of a battery distributor system in its place. A feature of the ignition system is the switch which incorporates a thermostatic throw-off arrangement by means of which it is impossible to drain the battery through neglect to pull out the switch button.

Willis-Overland Co., Toledo, Ohio

Princess

THE new Princess is larger, roomier and better equipped than previously. There is a new floating axle and a two-unit electrical system. With the new Disco electrical installation, a Bendix gear is used for the starting motor. To take care of the larger car, bigger brakes have been installed. The speedometer drive is now from the gearset gears. The new running boards are linoleum on wood, aluminum-bound instead of aluminum on sheet metal. An improvement has been made on the grouping of the instruments on the instrument board. The layout is now integral and contains the Van Sicken speedometer, speedometer light, ammeter, oil gauge, King lock, and a fuse box with spring attached cover. By taking out four screws the entire instrument assembly can be lifted out.

Princess Motor Car Corp., Detroit, Mich.

Pullman

CHANGES in the new Pullman include a two-unit electrical system, Bendix drive on the starting motor, gasoline tank in the rear with vacuum feed, a streamline body and rounded top, roomier seats, a slanting windshield and a larger front axle. The radiator is higher than the previous one, adding materially in the grace of the streamline body. Lamps are enameled black instead of nickled and two paint combinations are optional. The ammeter is on the cowl instead of under the hood and the instrument board is more compact.

Pullman Motor Car Co., York, Pa.

Regal

THE new Regal 4 thirty-two enters the field of moderate priced cars. It can be considered an entirely new model, and comes to succeed both of the four-cylinder models that were offered last year. The engine is entirely new. The frame is of tapered form instead of being straight as in previous cars. The gearset is in unit with the engine, a new starting and lighting system of Heinze make is fitted, the

drive is all changed, a better rear axle has been adopted, the gasoline tank has been removed from the cowl and placed at the rear and a new body and hood of tapered form have been fitted.

Regal Motor Car Co., Detroit, Mich.

Reo

REO is continuing its four for another season with a few changes. There is a new straight-line body with a slanting windshield. This body is roomier and more luxuriously upholstered than the previous one. In fact, the car, as a whole, is a much more comfortable one for the passengers.

Throughout the chassis no changes of importance will be noted. Here and there little details have been altered. More forgings are used than heretofore, these being used in the spring hangers. The new springs adopted are the patented Marshall type. The Rayfield carburetor has been adopted.

The Reo might rightly be termed the 50 per cent oversize car. In every part where a strain is heavy there is oversize construction. An example of this is in the spokes which have a section about 50 per cent greater than is ordinarily used.

Reo Motor Car Co., Lansing, Mich.

Richmond

THE makers of the Richmond will start production for 1917 on an entirely new series of cars. The entire car practically is manufactured in the Richmond shop. This includes the motor, gearset, rear axle, steering gear, body, top, fenders, universal, etc. The new models are improved as compared with the old in the following points: Higher speed engine, new method of rear axle drive, elimination of unnecessary parts, driving generator through timing gear and shaft instead of silent chain, fitting the carburetor to the engine block instead of a long carburetor pipe, centrifugal water pump instead of gear, lighter pistons and connecting rods, counter-balanced crankshaft, pressure oil feed instead of splash, four motor bearings instead of seven, semi-elliptic underslung rear springs

instead of three-quarter elliptic, frame of 1½-in. greater depth, wheelbase increased from 120 to 124 in., and a body of new type with a high cowl, convex sides, well-tilted seats, and a slanting windshield.

The Wayne Works, Richmond, Ind.

Saxon

MUCH improved over the previous series is the little four-cylinder Saxon roadster. Together with an increase in price the equipment has been materially added to and the body revamped in most commendatory fashion. For the first time this model is supplied with full electrical equipment, including a two-unit Wagner starting and lighting system and electric head and rear lamps.

The size of the tires has been increased from 28 by 3 in. on clincher rims to 30 by 3 Goodyears on demountable rims. These two important equipment additions, together with an electric horn and a speedometer, lift the little Saxon to an equal plane with high priced cars in the matter of completeness.

The body shape is quite new, and gives the car a longer and heavier appearance. Much thought seems to have been given to the matter of comfort in this new four with the wider seat and considerably better upholstery.

Saxon Motor Car Co., Detroit, Mich.

Scripps-Booth

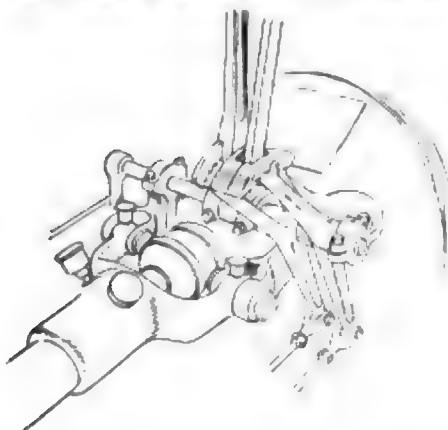
THE four-cylinder Scripps-Booth runabout is unchanged. Except for a few refinements the new model is identical with the original car of this type brought out 2 years ago.

One of the mechanical features of this high-grade small car is the easy adjustment of the inclosed overhead valves. This is accomplished by turning a nut protruding through the top of the cover plate after the oil cap has been removed. Consequently the valve may be adjusted while the motor is running.

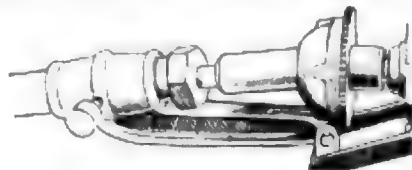
Scripps-Booth Co., Detroit, Mich.

Stearns

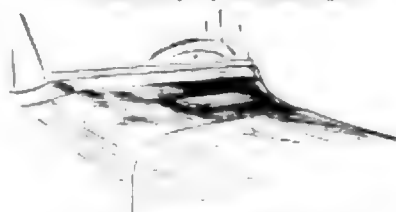
THE 1917 Stearns four-cylinder, Knight-motored car has a new body. This has the heavy comfortably appearing



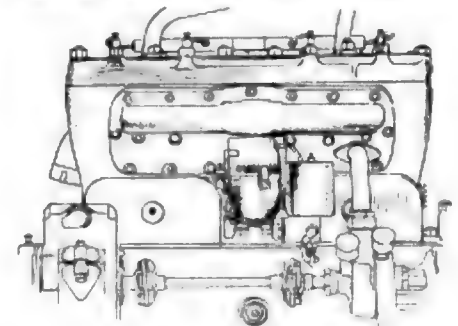
Unit assembly of universal, torsion tube, gearset and brake on the Crois Ekhart



Universal and speedometer drive on the main shaft of the Ross eight



Air vent in the Chalmers closed car



Carburetor side of the sixteen-valve White, which shows two universal valves, fuel pump and magneto

double-cowl type with high sides and deep seats. The dash is now made of mahogany and is fitted with a Stewart speedometer. Mechanically the only material change is the use of a disk clutch instead of a cone. One of the most popular models on this chassis, the four-passenger chummy roadster, will be continued without change. A change of \$45 on the four-cylinder models now is effective.

F. B. Stearns Co., Cleveland, Ohio

Studebaker

BETTER finish, better equipment, and refined mechanical characteristics without radical changes appear in the 1917 Studebaker four. This model has been given a price increase of \$55. Gunmetal finish of gray with black fenders is the most striking addition to the appearance of the car. The bodies are otherwise much improved, noticeably in the design of the auxiliary seats, which are large and well upholstered and slide entirely out of sight under the rear seats when not in use. Another new feature in the matter of seating is found in the reversible front-passenger seat.

Other features designed for the comfort and convenience of the passengers are Blackmore storm curtains which open and close with the doors without any buttoning and unbuttoning of the curtains necessary, door pads, semi-glazed upholstery of genuine leather, all-wool tonneau carpet, silk mohair top with leather edging, and a new Yale switch lock of the pin-tumbler type to insure the car against theft.

Mechanically the improvements are slight. Probably the most important is a reduction of 12½ per cent on the weight of the pistons, making them 5 ounces lighter than in the 1916 cars. This reduction in weight has been accomplished by milling out the piston skirts.

Studebaker Corp., Detroit, Mich.

Stutz

THE eye-opening announcement of Stutz for the 1917 season centers around the adoption of the sixteen-valve Stutz racing motor with modifications into a stock speedster. The new motor is a product of the Stutz factories and is the latest type of high speed, high efficiency powerplant. Only one body is applied to the sixteen-valve chassis. This assembly represents the 1917 Stutz Bearcat being strictly a racing type.

The other models are the Bulldog specials coming in both four- and six-passenger bodies and a new roadster. These are all placed on a standard chassis of 130-in. wheelbase. The motor in the Bulldogs is the familiar T-head cylinder type with a few changes, such as in the location of the carburetor and manifold and new facilities for heating the gases and a new manifold which has a water jacket of unusual capacity. Besides the water jacket there is a

flexible hot air tube to the carburetor from a stove on the exhaust manifold. The rear springs have been increased in length from 50 to 56 in., these lying perfectly flat when the car is loaded.

Stutz Motor Car Co., Indianapolis, Ind.

Templar

THE Templar Motor Corp., recently organized, will manufacture a four-passenger roadster at \$1250, a five-passenger touring car at \$1250, a five-passenger sedan at \$1850 and a two-passenger roadster at \$1225.

Templar Motor Corp., Cleveland, Ohio

White

A FOUR-CYLINDER motor with sixteen valves is the feature of the new White cars. Although the engine itself is a radical departure from the four-cylinder, two-valves-per-cylinder motor, which this company has previously produced, there are also a number of notable departures in the chassis design. For the first time in White practice the motor, clutch and gearset are in a unit. The new engine has plain bearings instead of the previous ball-bearing design which is continued on the other model.

The cylinders have removable heads, another new feature, and instead of the dash oil reservoir the oil is carried in the lower part of the crankcase. The gearset lever is a cane type with a standard gate, replacing the cross over shifting arrangement formerly employed. Semi-elliptic springs are employed and spare tires have been removed to the conventional location

in the rear instead of being carried in a well on the running board.

White Co., Cleveland, Ohio

Willys-Knight

CANTILEVER springs and improved bodies, together with a pressure feed lubrication system and a distributor replacing the magneto are high lights in the changes of the Willys-Knight for 1917. The car has a completely new rear axle and a new gearset in combination with the axle. Naturally with all these improvements the price has been slightly increased. The offering includes a seven-passenger touring sedan of the Springfield pattern and a seven-passenger limousine, besides the seven-passenger open car.

Willys-Overland Co., Toledo, Ohio

Woods Dual Power

THE Woods dual power car is the first of its kind to be produced. It incorporates a gasoline motor and an electric motor working separately or together, connected on the same drive line. The Woods electric has been discontinued. The new car is really an electric car which does not require a service station inasmuch as the gasoline motor serves to charge the storage battery which drives the electric motor. On a cold morning the car may be started on the electric motor and run at a rate of 20 miles an hour, turning the gasoline motor over any length of time until it starts. Then the car may be driven on the gasoline motor alone or on both powers.

Woods Motor Vehicle Co., Chicago

Six-Cylinder Cars

Abbott

CHANGES in the Abbott for 1917 are confined mostly to the body. There is now to be found double cowl, French lap upholstery instead of buttons and adjustable brake and clutch pedals. A chummy roadster has been added to the line, which is claimed to be as roomy if not more so than any on the market. Four color options are offered. There is a new Grant-Lees gearset and a Salisbury axle.

Consolidated Car Co., Cleveland, Ohio

American Six

THE American six embodies the ideas of Louis Chevrolet, engineer and veteran race driver. It is in the medium-price six-cylinder class and much attention has been paid to detailed refinements both mechanically and in the equipment. The frame is one of the strongest and most rigid of any car in its class and all the brackets, spring hangers, etc., are secured with particular care. Every provision has

been made to eliminate squeaks and rattles. An interesting feature of the lubricating system is the tunnel which incloses the camshaft. This tunnel always carries lubricant and the lower ends of the tappets dip into it.

American Motors Corp., Plainfield, N. J.

Anderson

THE Anderson program includes a five-passenger roadster which is unique in that the rear seat can be folded up and covered by a very simple operation converting the car into a two-passenger roadster. When the rear seat is closed, the space between the individual front seats, which allows entrance to the rear compartment, is also closed by an upholstered panel which folds from the floor. The opposite side of the panel is covered with carpet and serves as a part of the floor when the rear compartment is opened. Besides the roadster model this manufacturer offers a five-passenger touring car, six-passenger and seven-

passenger touring cars and a two-passenger roadster, all mounted on a single chassis powered with an L-head Continental motor.

Anderson Motor Car Co., Rock Hill, S. C.

Apperson Roadplane

THE motor size of the Apperson six follows the practice of 1916 cars as do the general principles of design, but mechanical refinements throughout make a much quieter and more powerful vehicle. The new car sells for \$200 more than the one with the same motor size in the previous model. Dry-plate disk clutches take the place of the contracting band clutches previously used. The design, finish and equipment of the bodies are luxurious and thoroughly well planned. Particular stress is laid on the new chummy car which is similar in seating arrangement to the four-passenger roadster of the 1916 Apperson model. Apperson Bros. claim to have been the first to introduce this type of body.

Apperson Bros. Automobile Co., Kokomo, Ind.

Auburn

TWO sizes, new in motor size and body, with a variety of bodies constitute the 1917 Auburn offering. The motors are similar in design, the difference being principally in size. An interesting feature in line with the present practice of reducing weight in the reciprocating parts is the embodiment of light lever arms which are carried on a shaft, this shaft mounted to a plate which forms a part of the valve housing cover.

The lower side of the lever arm rides on a cam at the end opposite the supporting shaft while the lower end of the valve stem rides on the upper side of the arms. This supplants the usual type of push-rod. There is a four-passenger tete-a-tete roadster which is an innovation as far as Auburn is concerned. The rear seat will accommodate two large passengers and affords plenty of leg room.

Auburn Automobile Co., Auburn, Ind.

Ben Hur

THE newly-announced Ben Hur might be termed a medium high-priced six. The prices being \$1875 for the touring car and cloverleaf roadster and \$2750 for the touring sedan. It is an assembled car with such standard parts as Buda motor, Bosch magneto, Westinghouse electric system, Timken axles, Stewart vacuum feed, etc.

Ben Hur Motor Co., Cleveland, Ohio

Bour-Davis

BOUR-DAVIS is bringing out a new model which will be exhibited for the first time at the New York show. It will be mounted on the same chassis as the old model but will be larger, more luxurious and more completely equipped. It is 9 in. longer than the old body, providing an extra amount of leg room in the driving

compartment and in the tonneau. Genuine leather upholstery is used and there are special patented springs in the back of the cushions, such as ordinarily are found in the highest-priced cars. A few of the details which have been added are: motor-driven pump, clock, automatic cigar lighter, genuine haircloth carpets, German silver trimming on the top, and special tool kits set in the door.

Bour-Davis Motor Car Co., Detroit, Mich.

Buick

THE production of the little six model Buick is being continued without change for the coming year. This overhead-valve, five-passenger job is now so familiar to the majority of motorists that a description is almost unnecessary.

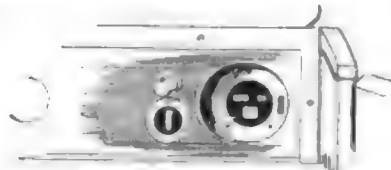
Particular emphasis is laid on the easy riding qualities of this car attributed to its low-hung and well-balanced body and its cantilever rear-spring suspension.

To supply an urgent demand direct toward Buick for a seven-passenger car this maker will show a new job with a new motor. The double-cowl has been adopted in an up-to-date streamline body. The valve-in-the-head construction is, of course, adhered to, with some modifications.

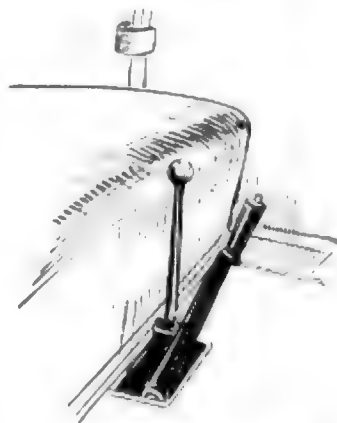
Buick Motor Car Co., Flint, Mich.

Chicago

THE Chicago light 6-40 makes its initial bow as the 1917 production. Among the claims of its sponsor is that it has the lowest center of gravity of any car made in the United States, still maintaining the 10-in. road clearance. Bright metal finishings are taboo in the Chicago, these being



Speedometer on the Inter-State is set at angle to face driver



Malbohm has located the control and brake levers close to the front of the driver's seat which makes the floor of the driving compartment especially clear

white enamel. Among those parts that are white enamel are the radiator, rims of the lamps, the windshield frame and the wheels, while the balance of the car will be a solid color which has been named Lake Michigan blue.

Pen-American Motor Corp., Chicago

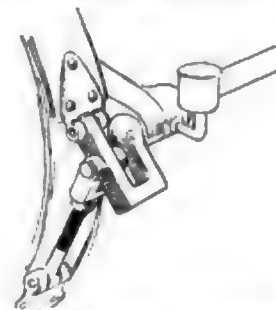
Chalmers

THE Chalmers model 6-30 is offered in a variety of body styles in which are found a five-passenger touring car, two-passenger roadster, cabriolet, seven-passenger touring car, Lucille sedan, town car and limousine. Particular emphasis is laid on the appointments of these new bodies.

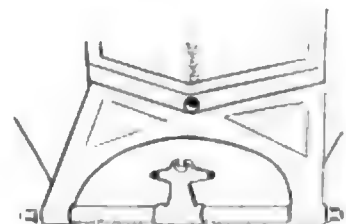
Pertinent to the present demand for inclosed cars, it might be well to mention a few of the Chalmers features in these models. Lucille—Lady Duff Gordon—the renowned designer of women's wearing apparel, has personally selected the upholstery material for all Chalmers inclosed cars. The effect is notable in the quiet but elegant appointments of the interior. In the tonneau are to be found completely appointed cases operated by springs and concealed except when in use. The right hand case contains a smoking set with removable ash tray, and at the left is lady's toilette with mirror, card case, memorandum book, etc. There are vases, clocks, hassocks, and umbrella holders with artistic dome lights, comfortable lounging pillows and silk window curtains and floor carpets, harmonizing with the interior finish.

There is a choice of several well-selected color options in all the closed cars. Chalmers 6-30 will be built in two lengths of wheelbase, a 115-in. five-passenger car, and 122-in. seven-passenger model.

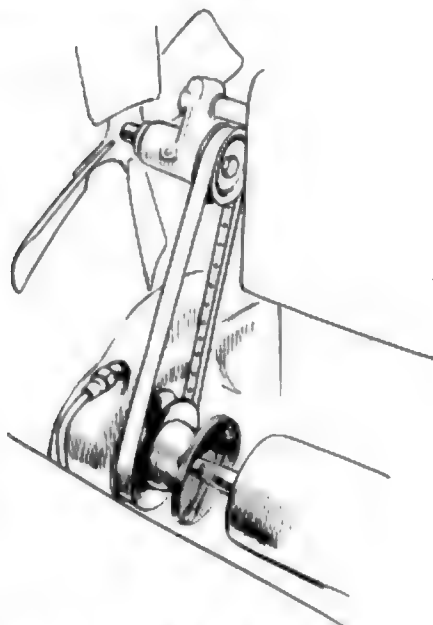
Chalmers Motor Co., Detroit, Mich.



Yoke in the brake assembly of the Lexington, which gives a very powerful leverage



The Scripps-Booth has a support for the starting crank when it is necessary to crank the motor by hand

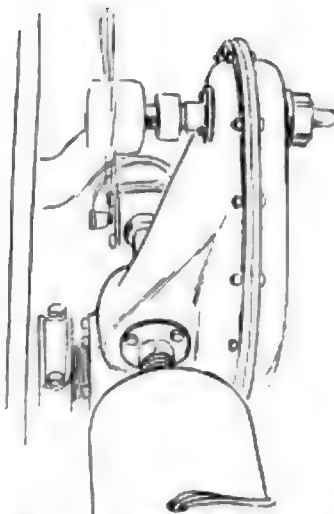


Drive for the fan on the Grant is taken from the end of the generator shaft

Chandler

CLOSED bodies are late features of the six-cylinder Chandler production. The four-passenger convertible coupe is of the Springfield design with the same seating arrangement as the Chandler roadster, namely a cloverleaf pattern with a wide rear seat accommodating two. However, there is even more room in the coupe seats than in the roadster as the baggage compartments at the sides have been removed thus giving an additional five in. in the seat.

The convertible sedan is also of the Springfield type with the usual side windows that may be removed, giving an open body effect. The auxiliary seats face forward and swing forward and down into compartments in the back of the front seats. The interior finish is simple, yet effective, a feature being a five-in. mahogany panel across the center of the



The generator and pump on the Ross eight are mounted at right angles to the motor and driven by worm gears inclosed in the case which houses the chain to the fan located above

door and around the compartment. Four color options are offered.

Chandler Motor Car Co., Cleveland, Ohio

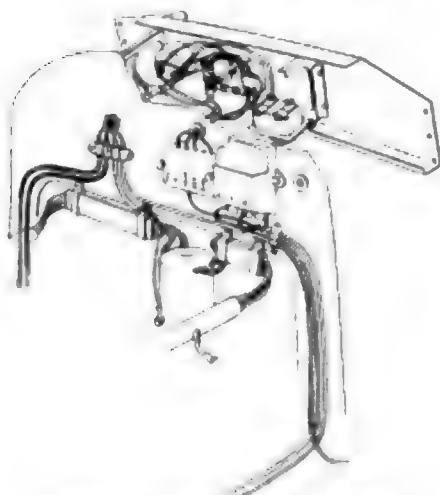
Charter Oak

THE Charter Oak is a high grade assembled proposition combining a Herschell-Spillman six-cylinder engine, a four-speed Brown-Lipe gearset and Timken axles.

Eastern Motors, Inc., Hartford, Conn.

Davis

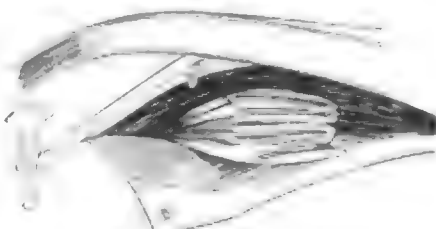
THE new Davis car is mechanically the same as in 1916. The only body change evident is in the shape of the hood, which now gives a clean sweep from the



In the Standard eight all the wiring and electric fixtures are assembled on the dash



Pierce-Arrow has its carburetor choker on the steering column



Pierce-Arrow has improved the arrangement for storing the curtains in the top so that there is no bulge

radiator to the cowl, there being no break evident.

George W. Davis Motor Car Co., Richmond, Va.

Detroit

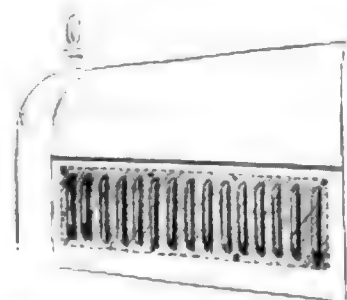
THE only new model which will be produced for 1917 will be a four-passenger roadster. All present models are continued with changes as follows: Borg & Beck clutch, Detroit Gear and Machine gearset, and Thermoid universals at both ends of the driveshaft. The bodies are lengthened, widened and lowered, the length having been increased 8 in. giving 3 in. more space in the front compartment and an additional 5 in. in the tonneau. The rear seat is now 47 in. wide inside the upholstery. On all cars the paint, upholstery and the details of finish are greatly improved.

Detroit Motor Car Co., Detroit, Mich.

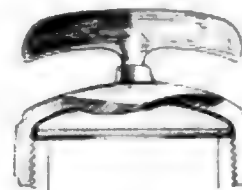
Dorris

DISTINCTIVELY new bodies appear on the new Dorris. The bodies are very roomy, befitting a car of this price and is completely appointed to the most minor details. The earmark of the car is the new radiator which is directly copied from the Peugeot design. The characteristics of the sturdy six-cylinder motor are retained in original form with a few alterations in the nature of refinements. A feature of the oiling system is the provision for direct oiling of the overhead rocker-arm bearings from the pressure pump. Another minor feature, but one which shows careful thinking on the part of the designers, is that the breather tube opens into the inclosed overhead-valve compartment utilizing what oil vapor is given off for a valve lubricant, instead of allowing it to spray over the motor exterior.

Dorris Motor Car Co., St. Louis, Mo.



Hudson employs a plate under the louvers of the hood corner to keep out the cold in winter



Cadillac has a special cap for the gasoline tank that uses a thumb screw, after the cap has been screwed down, to clamp a leather gasket over the opening

Elco

THE Elco six-cylinder cars will remain the same as last year, except that a Rutenber 3½ by 5 motor will be used. This car is an assembled proposition and is manufactured in comparatively small quantities by an old established company.

The Bimel Automobile Co., Sidney, Ohio

Elgin

AN ADDITION in wheelbase length and adoption of the center cowl gives the Elgin even more speedy lines than it had a year ago. Full cantilever spring suspension is a high light in the chassis of the new car. The springs are very long and are swung beneath the frame which permits the much-sought-for flat horizontal spring with cantilever construction. The new frame is a substantial proposition, an extra cross member having been added further to increase the rigidity. The motor is a Falls overhead-valve six with 3-in. bore and 4¼-in. stroke in which the intake manifold has been eliminated and the carburetor now bolts directly to a flange cast on the cylinder. The intake manifold is integral with the cylinder head.

Elgin Motor Car Corp., Chicago

Empire

NEW body lines throughout, giving liberal seating capacity, and a stronger chassis, are revealed in the Empires to be announced at the New York show. The new cars are refinements of those of a year ago for the only mechanical change is in the rear drive with the adoption of the Hotchkiss type with floating rear axle. The new chassis designated as model 70 is fitted with two bodies, the Tudor convertible sedan and the touring car, each having a 120-in. wheelbase. The high deep cowl topped by a tilted wind-

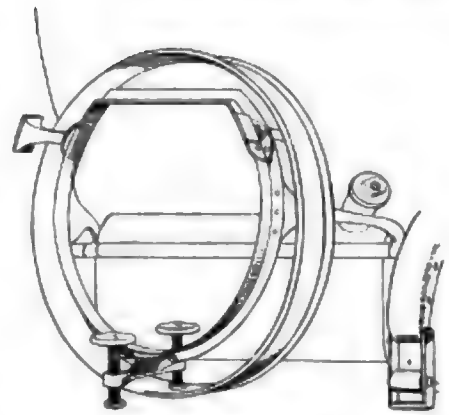
shield and the curved sides of the body accentuate its size. The double cowl effect is combined with divided parlor-car front seats. Two standard colors in upholstery combinations are offered, these being in cobalt blue body with black, long-grained leather upholstery and an autumn brown body with Spanish-leather upholstery to match.

Empire Automobile Co., Indianapolis, Ind.

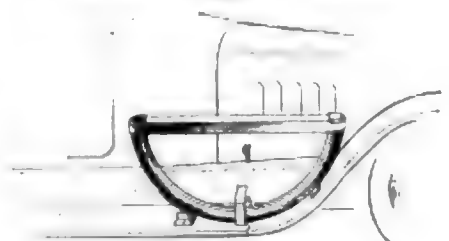
Franklin

ALWAYS an adherent to the principle of lightweight construction, Franklin has again reduced the weight of its product a matter of 400 pounds by scientific cutting down where weight was found to be unnecessary. The new engine is lighter, being a trifle smaller in bore, the gearset has had several pounds cut out and both axles are considerably reduced. In the smaller parts, pounds and ounces have been cut out here and there to swell the aggregate reduction. In the new car there are 133 separate drop forgings, 150 pieces made of aluminum and many of these supplant malleable iron castings and sheet metal parts. The most apparent exterior change is a new hood carrying out the Franklin dropped front shape, but being gracefully rounded into unbroken curves.

Typical of the use of aluminum are such units as the rear axle gear case engine base and oil pan, valve cages and covers, gearcase, carburetor body, mud guards, running board shields, body and hood. In the design of the front axles, 30 per cent of the weight has been saved in comparison with the previous type and in the rear axle 25 per cent. The motor is of small size, but the factor of light weight gives the car ample power. Aluminum pistons have been adopted to lighten reciprocating parts and make the motor quieter. The most marked change in the motor is the substitution of



Tire carrier employed on the Standard eight



Sedan carries a spare tire on the right running board

Atwater Kent ignition in place of the magneto. The air-cooling system is maintained with the same principle of draft created by the flywheel.

H. H. Franklin Mfg. Co., Syracuse, N. Y.

Geneva

THE Geneva six is another newcomer in the moderate-priced six-cylinder class and is built up of such standard parts as Herschell-Spillman motor, Brown-Lipe gearset and clutch, Timken axles, front and rear, Faddors radiator, Rayfield carburetor and Westinghouse starting and lighting with an Eisemann magneto for ignition.

Schoenbeck Co., Chicago

Glide

ALTERATIONS in the Glide are such as to render it more roomy and to increase the factor of safety. There also have been a few alterations which serve to making the car more nearly silent. Probably the most noticeable change is in the motor where the bore has been increased from 3 to 3½ in. The crankshaft has been rendered more rigid by increasing the diameter ¼ in. to 2 in. A fabroil gear is used in the camshaft drive for silence. The rear seat is 47 inches wide and the springs have been lengthened both front and rear.

Bartholomew Co., Peoria, Ill.

Grant

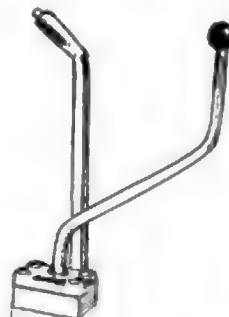
ALTHOUGH the most noticeable change over the previous Grant six is in the body lines, there are a number of mechan-



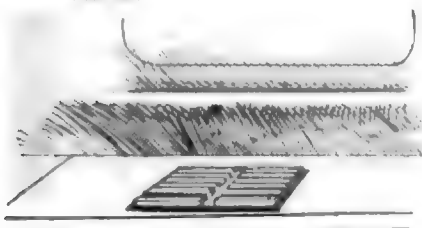
A special oil cup is used on the springs of the Haynes. The outer part turns until the two openings correspond, then oil is put in and the cap turned to close the hole



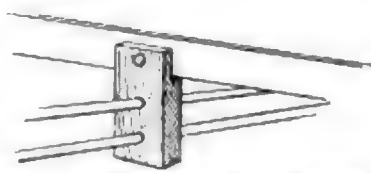
Type of leather universal used on the Overland



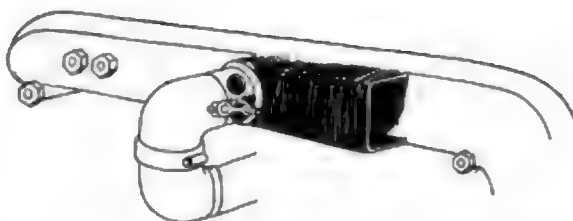
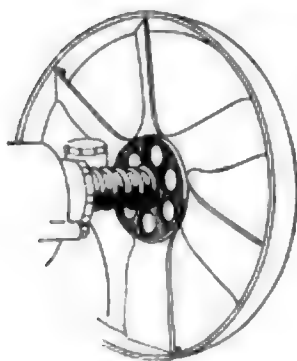
The control levers of the Jackson are novel in shape



Hudson makes use of a rubber scraper to clean the feet before entering the car



Crow-Elkhart has a wood block through which the brake rods run to prevent them rattling



Above, Overland hot air intake integral with manifold.
Left, spring clutch on Cadillac fan

ical improvements that help to make it a better car. A Wagner two-unit starting and lighting system replaces the single unit type and Remy ignition is fitted in place of that used in 1916 production. Stromberg carburetion gets a place along with a change in the fuel system from the cowl tank to a reservoir at the rear from which gasoline is drawn by Stewart vacuum feed. The bodies are quite changed. The radiator is rather high and unusually narrow and there is a boat-like sweep from this to the back of the rear seats. Grant has entered the inclosed-car field with a convertible sedan and convertible coupe. In all bodies particular attention has been paid to roominess and provision for the comfort of the passengers. In attaching the gasoline tank to the rear, the same supports are used to carry the spare tires. This feature is found on the touring model. On the roadster the extra tire is housed in the rear deck.

Grant Motor Corp., Findlay, Ohio

Haynes

FOR the coming season Haynes will offer two chassis types which carry either the six-cylinder or twelve-cylinder motor. The latest announcement in the new offering is a four-passenger roadster which will be fitted on the 127-in. wheelbase only. The rear seat in this model is 44 in. wide and the distance from the front of the rear to the back of the front seat is 30½ in. With a seat width of 17 in. one will understand there is plenty of leg room in this rear compartment. The model 36 six-cylinder car has 121-in. wheelbase, and the model 37 a 127-in. wheelbase.

Besides the four-passenger roadster there are five and seven-passenger touring cars and a very attractive Springfield type touring sedan with removable side panels.

Haynes Automobile Co., Kokomo, Ind.

Hollier

A six-cylinder car of small size has been added to the Hollier output, which heretofore was confined to eights only. Probably the most noticeable feature of the new motor is the accessible arrangement of the valve action, it being of the overhead valve type. This is entirely con-

tained in the cylinder head which is detachable, thus allowing the valves to be readily ground besides affording easy access to the pistons and cylinders. All of the valves are actuated by a single camshaft through use of a rocker arm motion and this camshaft is driven through helical gears, steel against iron, running in a bath of oil.

Lewis Spring and Axle Co., Chelsea, Mich.

Howard

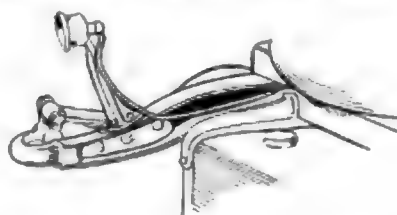
THE Howard makes its first appearance as a 1917 model in touring roadster, sedan and coupe. The powerplant is a Continental with a bore of 3¼ in. and a stroke of 4½. The company gives three color options on the touring car and roadster with a number of options on the sedan and coupe.

A. Howard Co., Galton, Ohio

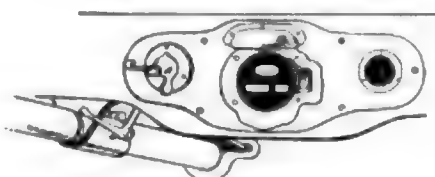
Hudson

THE Hudson Super-six is being continued without mechanical change. The bodies also remain the same. The most recent announcement concerning Hudson cars centers around the new radiator shutter which may be mounted on any Hudson Super-six radiator or will be furnished at the factory on new cars at extra cost. This shutter is operated from the driver's compartment and is designed to regulate the water temperature for most efficient operation regardless of the atmospheric temperature. It also provides the means of heating the motor quickly when starting in cold weather. A Boyce Motor-Meter is essential as part of this equipment.

The Hudson Super-six with its counter-



Method employed by Stutz for hanging springs to rear end of frame



Hupp control board

balanced crankshaft is now almost too familiar to need description. The motor on a slightly altered form has made very creditable showing on the speedways during the past season.

Hudson Motor Car Co., Detroit, Mich.

Jeffery

JEFFERY has joined hands with a number of other manufacturers in the matter of price increase, there being a raise of \$100 on the three six-cylinder models which include a seven-passenger touring car, a roadster, and a seven-passenger sedan. Jeffery bodies are generally considerably lower than they were a year ago and the beauty of lines is enhanced by what the makers term the roll-edge, which is in reality a tumbled-in top which differs from the usual type of tumbled-in top inasmuch as the slope comes more or less from a straight-side body instead of a curved-side body.

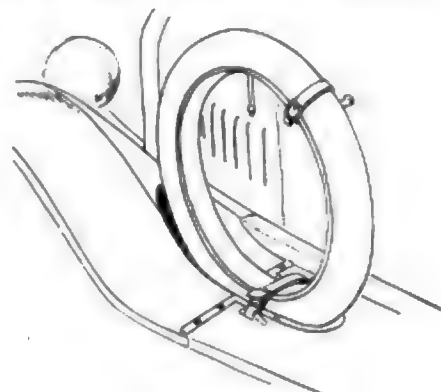
The new seven-passenger sedan is particularly attractive in its straight-line characteristics which are carried out all the way through, even to the interior arrangement.

One feature of the Jeffery which varies considerably from present-day practice is the use of straight-side members in the frame. This frame is provided with four cross members, making it one of great rigidity. The gasoline tank and spare tire support are hung directly onto the frame in the rear, by the use of side rail extensions.

Nash Motors Co., Kenosha, Wis.

Jones

THE 1917 Jones 6-60 is an entirely new product. It has a 3½ by 5¼-in. motor, combination force feed and splash system of lubrication, Stromberg carburetor,



Above—Oakland's method of tire carrying. Below—Overhead valve arrangement



Timken axles and a modern streamline body, placed on a 123-in. wheelbase chassis. There is included a seven-passenger touring car and a touring sedan with a demountable top. The 1916 five-passenger touring car has been discontinued, and the above two models, together with a four-passenger roadster complete the new season's offerings.

Jones Motor Car Co., Wichita, Kan.

Jordan

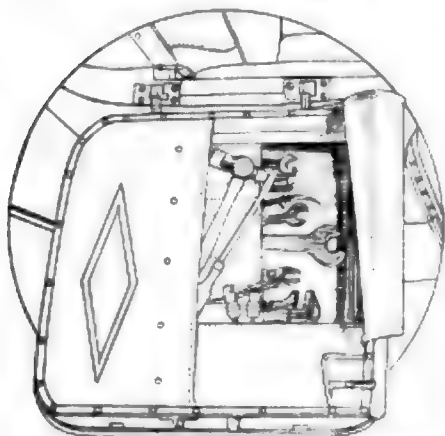
A LUXURIANTLY appointed body is placed on a chassis built up of high-grade assembly units in the Jordan car which was a newcomer in the 1916 season. The car is thoroughly distinctive in its lines and in pace with the demand for originality a great number of color options are offered to suit any taste. The upholstery is of the best hand-buffed leather. The back of the front seat contains folding seats which drop into compartments and are covered by leather flaps. All of the rest of the seat back is light mahogany, built in a true custom-built style of job made with many pieces with matched grain. There are omitted no small details of body equipment which could contribute to the comfort of the occupants.

Jordan Motor Car Co., Cleveland, Ohio

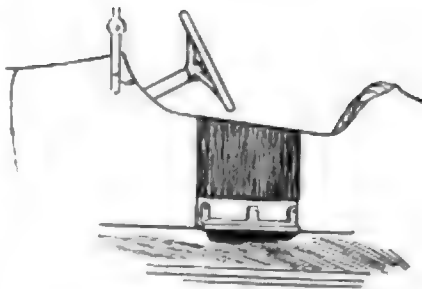
Kisselkar

SCIENTIFIC reduction of the size of parts and modifications necessary to the construction of a lighter vehicle has produced the new Kissel hundred-point-six which is a moderate priced car retaining the general principles of design and thorough workmanship which have characterized previous models of this make. The bore of the new motor is $\frac{3}{8}$ in. smaller than that of the 1916 model 42, while the stroke is $\frac{1}{2}$ in. smaller. The 5-in. shorter wheelbase tends toward weight reduction throughout the chassis construction. In fact the weight has been so reduced that tires of 32 by 4 size are sufficient to handle the load, whereas the model 42 was equipped with 35 by 4 $\frac{1}{2}$ tires.

Of course one of the particular talking



Handy tool compartment in the left front door of the 1917 Paterson



Protective pad used in Stutz

points of the Kisselkar is the All-Year body type which is to be had on the new chassis in sedan, coupe and town car styles. These detachable tops are fitted to the bodies with wallpaper smoothness in the Kissel factory. Removable, inclosed bodies will be continued on the 5-42 chassis also, for the 1917 season.

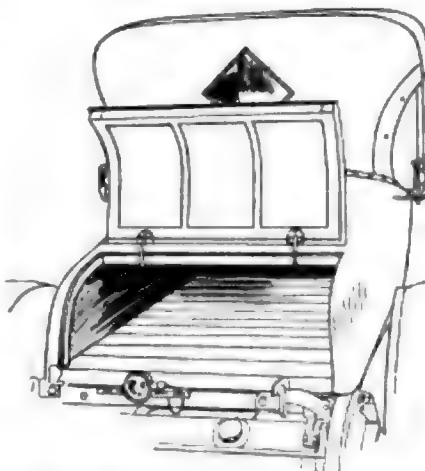
Kissel Motor Car Co., Hartford, Wis.

Klinekar

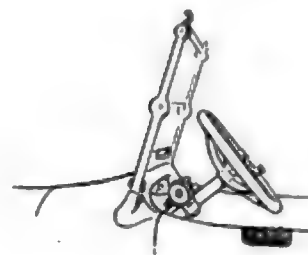
FOR the 1917 season the Klinekar line will be featured by a Shamrock roadster of the four-passenger cloverleaf design mounted on the same chassis as the touring car and roadster which, except for minor details, is practically the same as the chassis used in 1916.

Among the features are simplified adjustment of the carburetor, protection of the driveshaft, which is the open type with two universals, by a U-piece attached to the cross member to prevent any damage in case the shaft should break, holding it in suspension. The front wheel bearings have been increased in size as well as the hubs and the rear axle housing has been increased in thickness and reinforced by an extra tube riveted to the housing. Bodies have been changed to the double cowl design with streamline effect, the windshield has been slanted and the top material has been changed to Neverleak.

Kline Car Corp., Richmond, Va.



Rear deck compartment for spare tires of the 1917 Allen roadster



Close-coupled bracing for steering column in Reo

Lexington

TWO chassis and a rather wide range of body styles will make up the Lexington line for 1917. One is an entirely new chassis known as the 6-T and the other is an improvement on the 6-O of 1916. The 6-N model has been discontinued.

There are a number of minor improvements, such as moving the battery under the driver's seat, substitution of heavier bearings in the front wheel and changes in body design to give better appearance and comfort as well. A Schebler carburetor is used now instead of a Rayfield.

The rear spring suspension has been improved, the forward end being dropped several inches so that the center of gravity is a straight line from front to rear. Headlights on both models are now mounted on the radiator and the Moore multiple exhaust system, designed to give added horsepower with a smaller fuel consumption, is continued. Leatherette is now used instead of mohair as a top material.

Lexington-Howard Co., Connersville, Ind.

Liberty

DISTINCTIVE body lines characterize the new Liberty six-cylinder car. Built on a wheelbase of 115 in. this car strikes you at first glance with its sharp angles and straight lines not usually found in the body types of the day. These have been blended into what might be called colonial tendencies with various curves and angles, being proportioned to produce a harmonious effect. This car is Continental motored with Deleco electrical equipment, Timken axles, Borg & Beck clutch, Detroit Gear and Machine Co. gearset, Rayfield carburetor, etc.

Liberty Motor Car Co., Detroit, Mich.

Locomobile

THE Locomobile chassis and body for 1917 follow much along the lines of the last six years except for detail changes intended to give the final touch of refinement which are designed specifically to be the last word in beauty and luxury. Broadly speaking the new cars are more beautiful in appearance because they are lower and longer. They are more easy riding, due to a rearrangement of the sus-

pension and are faster, having better acceleration and higher maximum speed due to a new carburetor, lighter reciprocating parts and a better balanced motor. These changes have been accompanied by a boost in price which is so general in the industry now. A feature of the body offerings is the new four-passenger job of which only a limited number will be constructed.

Locomobile Co. of Am., Bridgeport, Conn.

Lozier

THE seven-passenger touring car and a limousine is built on the Lozier six chassis, which has 132-in. wheelbase. The feature of the Lozier six is the direct method of drive. The motor is of Lozier construction throughout and has a bore of 3 3/4 in. and a stroke of 6 in. Electric system is Gray & Davis. The Lozier six makes use of the special tire carrier and there is also a trunk rack in the rear which combines with the tire carrier, the trunk fitting inside the spare tire. The headlights are fitted with special dimmers which meet the requirements of most city ordinances.

Lozier Motor Co., Detroit, Mich.

Madison

ALTERATIONS in the appearances of the bodies constitute the principal Madison changes, the lines having been made to correspond to the flat cowl design so much in vogue. On the five-passenger body a single front seat is used, while on the seven-passenger, the boat-shaped design is carried out with divided front seats and auxiliary seats which fold against the back of the front seats when not in use. The cushions are comfortably slanted and there is an abundance of leg room in the front compartment. The powerplant is a six cylinder, L-head Rutenber.

Madison Motors Co., Anderson, Ind.

Marion-Handley

THE recently announced Marion-Handley car has a six-cylinder 3 1/2 by 5 1/4 block-cast motor of the L-head type, with an aluminum crankcase. The body lines in this car carry out the principle of a straight line from the top corner of the

radiator back to the rear seat. Combining this straight-line feature with tumbled-in body sides and the gracefully-rounded double cowl and slanting windshield, the whole car is indeed attractive in appearance. Much attention has been given to riding qualities, the rear springs being very nearly flat, semi-elliptic with a 57-in. length. The color is dark olive green and all bodies are hand filled, rubbed and finish.

Mutual Motors Corp., Jackson, Mich.

Marmon

THE changes in the Marmon are negligible, being little refinements here and there to make this light-weight and powerful car more perfect. The Marmon is a big car, yet it weighs no more than a good many makes that are much less powerful and roomy. This weight reduction is attained by the extensive use of aluminum, the cylinder casting being made from this metal as also the body panels, radiator shell, rear axle gearbox and fenders. The particularly easy-riding qualities are obtained by the use of compound cross-suspension cantilever springs.

Nordyke & Marmon Co., Indianapolis, Ind.

McFarlan

CONCENTRATING on one chassis and one motor size, a departure from previous practice, the McFarlan Motor Co., will devote its entire attention in 1917 production to one model—the McFarlan 90. Among the features are a complete line of smart body designs covering everything from the touring roadster to the Victoria touring in open cars, and from the large Berlin to the speeding sedan in inclosed

TYPE One of the most distinctive features offered is that of an option of a full magnetic transmission built under the latest patents. This transmission is furnished on the same chassis as the regular sliding gearset, but at an advance in the list price of \$1,000.

There are no radical changes in engineering features, the principal difference being in matters of refinement and design, among these being the low cradle spring suspension for appearance and comfort and

a better design of valve pockets and firing chambers in the motor, which give greater power and efficiency.

McFarlan Motor Co., Connersville, Ind.

Mitchell

THE 1917 Mitchell six is a larger, roomier and considerably more beautiful car than the previous issue. Mechanically changes are confined to minor refinements and such increases in strength and size of parts as was made necessary by the 2-in. increase in wheelbase. There is a large number of body types offered, all having the high and narrow radiator and smooth sloping hood.

Two little items which indicate the extent to which comfort has been considered are the glove compartment in the instrument board and the tonneau light in the back of the forward seat. Within the instrument board there is fitted a new compartment in which small traveling requisites may be carried and which is locked by the same key that operates the ignition lock.

The makers have announced four new inclosed cars, a cabriolet, sedan, limousine and coupe. The sedan is of the Springfield type and is finished upholstered and equipped in limousine style. The cabriolet is another fore-season model and is a three-seater, an auxiliary seat for the fourth passenger.

Mitchell-Lewis Motor Co., Racine, Wis.

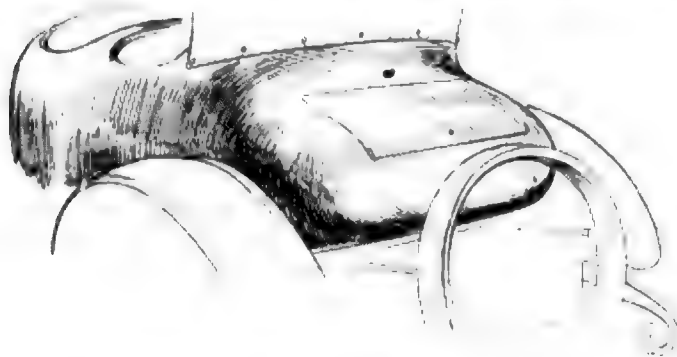
Moon

THE most recent change in the 1917 Moon model is the advance of \$40 on the 6-66 effective January 1. The price of this car is \$1,690, while that of the 6-43 is continued at \$1,295. The latest models are equipped with high radiators, these being about three in. higher and narrower on top, a high-cowled body and a low, slanting windshield, whereas the earlier 1917 models were equipped with a high windshield. The lower windshield gives the car a much better appearance. In fact, the few body changes which have been made, make the two new sixes appear bigger, more powerful and of much more graceful outline.

Moon Motor Car Co., St. Louis, Mo.

National

THE National Highway six is being continued without material change. Following the general trend the prices are somewhat higher. The car is characterized



Haynes four-passenger roadster has luggage compartment in rear deck

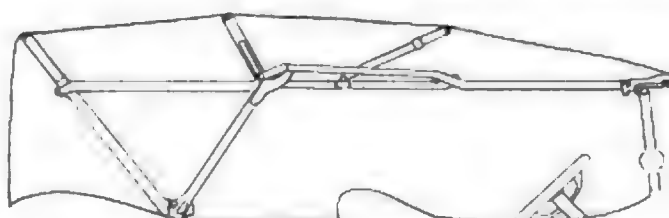
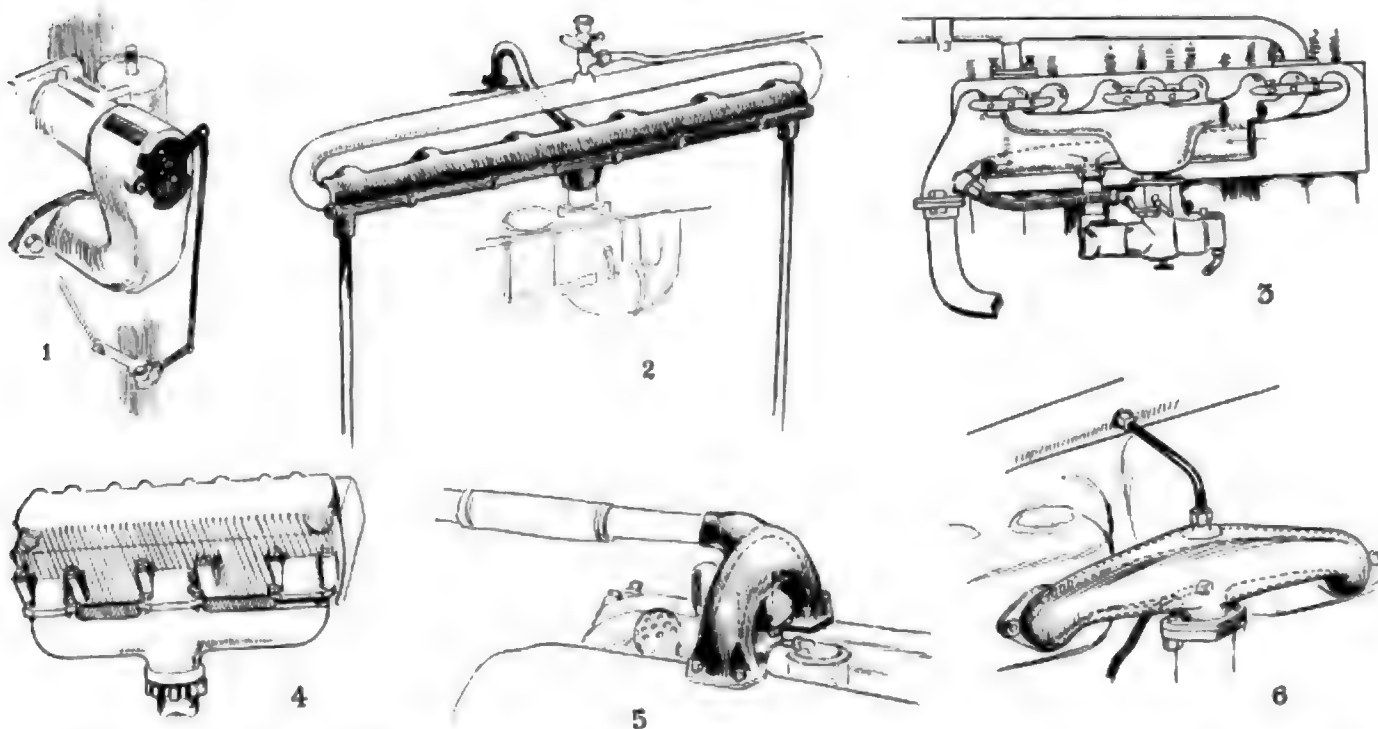


Diagram of Cadillac top



Manifold refinements on 1917 engines. 1. Carburetor on Hupmobile, showing unusual air intake. 2. Franklin's manifold heater. 3. Buick's hot air intake integral with the exhaust manifold. 4. Manifolding on the Jackson eight. 5. Packard's water-jacketed intake. 6. How the Stutz intake is heated by the water.

by its long low lines which has been a National feature for a number of years. In fact, the National company was one of the pioneers in the low-hung, straight line type of body.

National Motor Vehicle Co., Indianapolis, Ind.

Oakland

THE most recent announcement concerning the Oakland model 34 is a price increase from \$845 to \$875. The car differs considerably from the model 32, although the overhead-valve-six motor is retained with but very few changes. Probably the greatest improvement is in the body, which is much roomier than heretofore. Another attractive alteration is found in the new semi-elliptic rear spring suspension, replacing the three-quarter elliptic in the previous model.

The springs are now underslung and are carried low under the frame by special hangings so that they lie very nearly flat when the car is under load, a feature which is characterizing a great many new models. Delco lighting, starting and ignition is used in the same form as it was on the later model 32s which replaced the other make used on a large number of the early model 32s.

To give an idea of the roominess of the new body, the front seats are 42 in. and the rear seats 46 in. wide inside the upholstery. In the rear compartment there is a space of 46 in. from the back of the front seat to the front of the rear seat back.

The new body carries out the flaring

design from hood to rear seat so much in vogue.

Oakland Motor Company, Pontiac, Mich.

Overland

OF course the most recent Overland announcement is the price change which has just gone into effect. The model 75-B is a new series which has taken the place of the previous four-cylinder car. It is characterized particularly by a larger motor with 3½-in. bore and 5-in. stroke which is claimed to develop 31½ hp. at 1915 r.p.m. and to have a speed of from 24½ to 33 m.p.h.

Another feature of the car is that it is equipped with 4-in. tires. It has cantilever suspension, two-unit, six-volt starting and lighting and the body is now fitted with a one-piece cowl which slopes back in a graceful curve.

The new model on this chassis is the club roadster which is a four-passenger job of rather unique construction. The interior is strictly boat shaped, having a well-rounded back into which the rear seat is blended. The color of this new car is battleship gray with upholstery of a delicate gray shade. Wire wheels are standard.

Willis-Overland Co., Toledo, Ohio

Owen-Magnetic

OWEN Magnetic cars are built in nine models, four on the 125-in. wheelbase chassis and five on the 126-in. wheelbase chassis. In presenting the new styles it means that for the first time bodies built in the company's own shops are placed on the Owen Magnetic chassis. There are touring cars, coupes, limousines, town cars,

landaulets and cloverleaf roadsters, all of very distinctive and attractive appearance. Of course, the big feature in these cars, as it has been previously, is the use of a magnetic form of gearshift, if gearshift it might be called.

The Baker R. & L. Co., Cleveland, Ohio

Paige

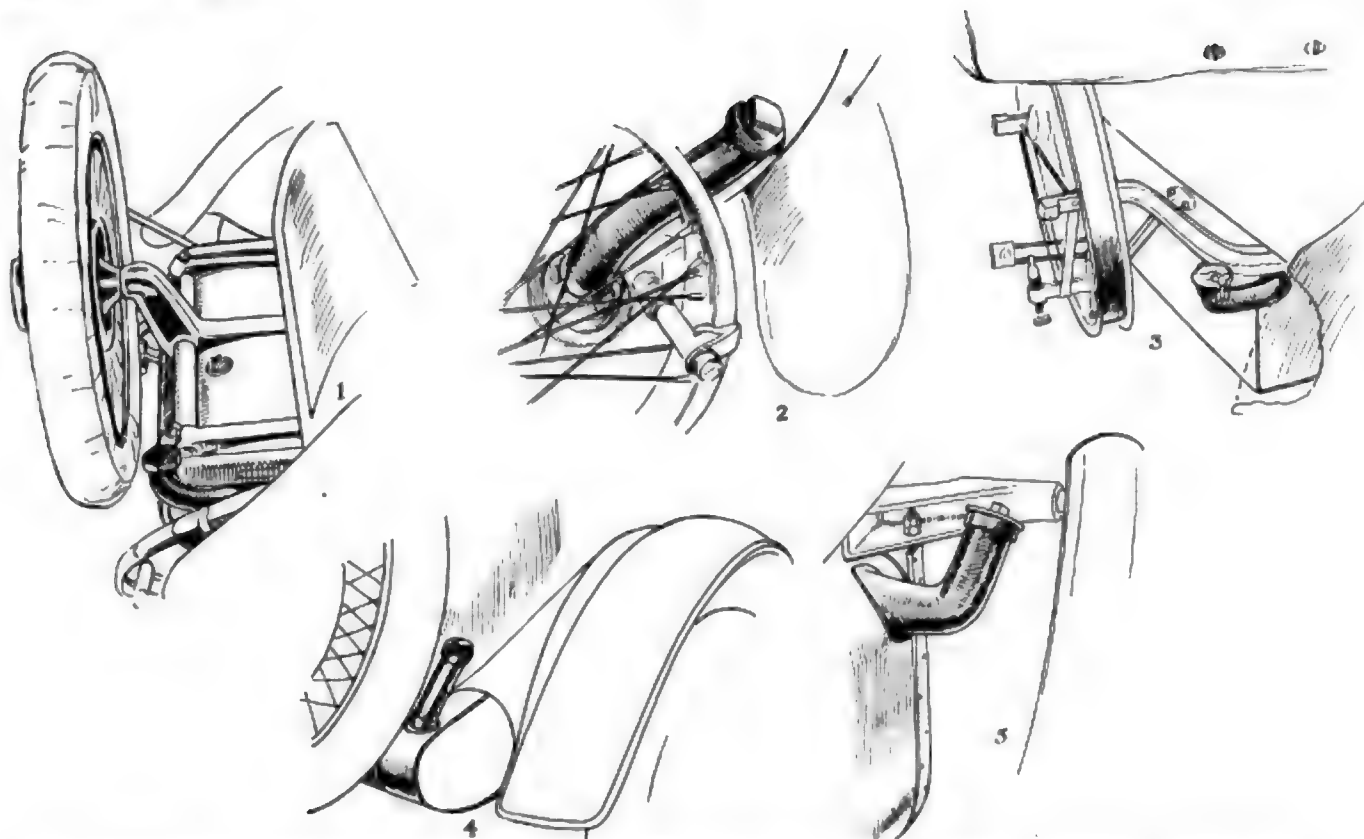
THE latest feature in the Paige products is a convertible two and four-passenger roadster which will be announced for the first time at the New York show. This new body contains very unique and ingenious features of design. The top which resembled a canopy type is alterable either to cover the front two seats alone or the front and rear seats both. By a unique assembly the rear compartment may be entirely decked over when desired.

The new series announced some time ago includes a continuation of the Fairfield, model 6-46, and in addition, a smaller six-cylinder car known as the 6-38, continued without change. The changes in the 6-46 are not radical, but include body changes, such as sloping windshield, new upholstery in which the leather is arranged in piping, better springs in the upholstery, leather door flaps, and a mahogany instrument board. The only mechanical change is the addition of a single-cylinder tire pump which is mounted on the gearbox, and which is driven by a reverse idler.

Paige-Detroit Co., Detroit, Mich.

Paterson

THERE are two important mechanical changes and a new four-passenger roadster body in addition to a new design



Spare wheels and tires make necessary special arrangements for filling fuel tanks. 1, Jeffery. 2, Winton. 3, National. 4, Scripps-Booth. 5, Another ingenious method

of touring car body with the popular double cowl effect in the new Paterson. Mechanical changes are the adoption of a Hess floating axle and the use of a Hotchkiss drive whereby the drive and torque are taken through the rear springs. In the body perhaps the most noticeable differences are the new lines and the wider and longer dimensions which add to the roominess of the vehicle. As an added touch of modernity, the windshield has been given a slight slant. To give more leg room to the front seat passengers, this seat has been moved back a few inches.

W. A. Paterson Co., Flint, Mich.

Pierce-Arrow

THE changes in the Pierce-Arrow models are very slight. In all essential details all three six-cylinder models are the same as heretofore. The water outlet is neater; the wiring has been simplified; the battery distributor is now mounted on the generator, eliminating the separate commutator shaft and driving gears; the positions of magneto and generator have been interchanged so that the water pump will absorb the intermittent torque reaction of the magneto; spiral-bevel driving gears have been adopted; the pressure of the oiling system has been raised and an ammeter has been substituted for a voltmeter on the cowl. Of course the high-class finish and complete equipment in this car are retained.

Pierce-Arrow Motor Car Co., Buffalo, N. Y.

Pilot

A FIVE-PASSENGER, double-cowl touring car and a four-passenger get-chummy, both on one chassis, are Pilot's 1917 offerings. The new chassis replaces two of the previous production year and the new motor is block-cast of the L-head type with cylinders cast integral with the top of the crankcase. The cam, pump and magneto shafts are driven by helically-cut gears inclosed in an oil-tight case. In the get-chummy model the rear seat is 41 in. wide and an accessible suitcase apartment is located in the rear. Entrance is gained through a section of the back of the rear seat, which may be lifted out, making a large opening into the curved back of the body.

Pilot Motor Car Co., Richmond, Ind.

Premier

THE entirely new Premier has an overhead valve motor, mostly aluminum, and a magnetic gearshaft. The obvious features are its projectile body lines, an unusual amount of passenger room in proportion to its wheelbase obtained chiefly by placing the motor well forward and into the V of the well-pointed radiator. The cylinder block and the crankcase are one aluminum casting and within the cylinder bore there is slipped a gray-iron sleeve held from downward movement by a shoulder that fits a recess in the aluminum casting and held from upward movement by the cylinder head casting which carries

the valves. The valve mechanism is entirely inclosed, although the overhead principle is employed.

Gearshifting is accomplished by the use of a magnetic shifter manufactured by Cutler-Hammer. In the cooling system a thermostat is embodied by which the water is kept at an efficient temperature. The fan and impeller of the water pump are mounted upon a single, small hardened and ground shaft.

Premier Motor Corp., Indianapolis, Ind.

Reo

ON THE Reo six there is an entirely new body with sloping windshield, auxiliary seats which now fold into the back of the front seat, new plaited upholstery in place of the tufted and better equipment such as robe cords on the backs of the divided front seats and a top which is rounded off in the rear giving a limousine effect.

There is also more seating room in the car, the body being 2 in. wider at the point of juncture of the windshield. Mechanically, few changes have been made.

The engine has been provided with more complete methods of heating the air and the inlet lifter mechanism has been improved so that there is a better guide alignment for the roller follower. The crankshaft diameter has been increased somewhat and now transmits the drive through a new form of fabric universal.

Reo Motor Car Co., Lansing, Mich.

Roamer

ONLY one model of the Roamer will be made for 1917. This is the same chassis that was used last year with a few minor refinements. The principal changes are the addition of a roadster and inclosed bodies, whereas the manufacturer made only one body type last year, except on special orders.

Barley Motor Car Co., Streator, Ill.

Saxon

THE new Saxon six is a decidedly better looking car than its predecessor, although that car was a most attractive vehicle. It has a somewhat altered body line to bring it into accord with present-day body fashions, the straight-line effect being well carried out. The body is 4½ in. longer, wider and in every way more roomy and has a slanting windshield and new style crown fenders making its body lines modern to the highest degree.

In addition to greater comfort due to softer and deeper cushions, new cantilever springs are fitted which are of the full instead of the half-cantilever type. These new springs are 41½ in. long which, contrasted with those in the previous model which were of 30-in. length, shows one that the riding qualities are considerably improved.

Several changes are to be found in the motor, perhaps the most important of which is the increasing of the size of the crankshaft.

Saxon Motor Car Co., Detroit, Mich.

Simplex

SIMPLEX follows its previous policy in building chassis only and these chassis are built with the idea of producing the ultimate in motor car production regardless of price. The chassis price of \$6000 is indicative of the material and workmanship which is put into this huge car. The model V Simplex chassis has a wheelbase of 143½ in., carried on 36 by 4½ in. tires in front and 37 by 5 in the rear. The six-cylinder motor has a bore of 4.375 and a stroke of 6.25 in.

Simplex Automobile Co., New Brunswick, N. J.

Singer

WHILE the major percentage of bodies for the high-priced Singer cars are custom built the concern is marketing a standard roadster, touring and closed cars. The standard touring design is a seven-passenger type with the Belgian double cowl. There is a number of detailed improvements in the new chassis, such as Magnalite pistons, pressure oiling instead of splash to the connecting rod bearings and a longer, lower body, although the wheelbase is shorter. The wheelbase is now 136 in. instead of 138. There is a new design of gasoline tanks which is of rectangular section instead of cylindrical. The

rear springs are now flatter under load than they were formerly, tending toward easier riding.

Singer Motor Co., New York

Stephens

THE Stephens six is built to carry five-passengers and includes such features as bevel gear drive, adjustable pedals and a distinctive body finish in deep blue and gold striped with wheels of old ivory. Color options requiring thirty days notice are Brewster green, maroon or black with old ivory wheels or wheels to match the bodies.

Stephens Motor Branch of Moline Plow Co., Moline, Ill.

Studebaker

FROM a manufacturing standpoint, the outstanding feature of the Studebaker line is its standardization. The four and six are exactly similar in design throughout. Both motors have their cylinders cast in a single block of similar dimensions, 3¾ by 5, and with all parts similar from one end of the chassis to the other, excepting where structural dimensions differ, on account of difference in the power plants.

Studebaker characteristics which have been continued this year are the rear axle gearset, cone clutch and Wagner electric lighting and starting. Motor changes are described in the short description of the four-cylinder car, except that it is not mentioned that the oil pump has been changed slightly in the way of making a tighter fitting pump, which has increased its ability.

The generator has been improved by alterations in the wiring which gives much better charging characteristics. About 3 amp. increase of current is furnished the battery at a car speed of 15 m.p.h., while the maximum charging rate has not been altered. Another detailed change in the electrical equipment is in the head lamp mounting by means of which the lamp can be turned and fastened in any position.

Studebaker Corp., Detroit, Mich.

Sun

FOR 1917 there will be four different bodies, all on the same chassis, comprising a five-passenger touring car, four-passenger roadster, seven-passenger touring car, and five-passenger sedan. The general features of design will remain the same as in the 1916 models. The Sun motor is built in the Elkhart factory and has such special features as dual-ejector exhaust manifold, roller valve lifters, and flexible three-point suspension. A new seven-passenger touring car and four-passenger roadster are of the double cowl type with slanting windshield. Hand flaps have been added to all doors.

Sun Motor Car Co., Elkhart, Ind.

Velie

THE 1917 Velie Biltwel line is a continuation of its two sizes of six chassis with several marked alterations in the nature of refinements and distinctly different bodies which are roomier and even more gracefully designed than any previous models offered by this factory. In line with the policy of the majority of the manufacturers, the new cars are slightly increased in price.

Timken axles and bearings are now featured with all models. More power and greater economy are claimed to have been obtained in minor refinements of the power-plants, and the use of the new axle constructions.

In the design of the Velie bodies for the new models, no attempt has been made to follow what might be considered the conventional type of construction. They are thoroughly distinctive and of weighty appearance. High grade leather and real curled hair are used in the upholstery.

Velie Motor Vehicle Co., Moline, Ill.

Westcott

NEW streamline bodies, a few mechanical changes, an increase in price in the big six and a discontinuation of the small six appear in the 1917 Westcott offering. The new body lines are of the streamline effect with full-curved cowls and a full bell-curve in the rear of the body. All models are swung considerably closer to the ground than heretofore giving a center of gravity four inches lower. Sloping windshields have been adopted and the aisleway between the front seats is two inches wider than previously. The bodies are of the bulging type, the sides being well rounded and tumbled in.

Westcott Motor Car Co., Springfield, Ohio

Willys

WITH the exception of a longer hood, the new Willys seven-passenger 88-Six is identical in outward appearance with the Willys-Knight Four. This is not a Knight motor job, however, but is of conventional L-head type. Cantilever springs have been substituted for three-quarter elliptics, battery ignition through the Connecticut system has taken the place of the magneto, the gearbox used on the 1916 Willys-Knight has been adopted, and the gasoline tank has been removed from under the seat to the rear of the car, the change bringing with it the installation of a Stewart vacuum feed system.

The motor in this car is a Continental and starting and lighting is performed by the Auto-Lite system. The lines of the body are unbroken from front to rear. The radiator edges are rounded and the radiator is slightly higher; the top edge of the body is rolled in and there is a double cowl and tilted windshield.

Willys-Orrland Co., Toledo, Ohio

Winton

NO changes have been made in either of the Winton models. It is moreover not Winton policy to announce season models, but rather to adopt what changes are found advisable as soon as arrangements can be put through the factory. The buyer of a Winton is encouraged to suit his taste in details of finish and equip-

ment and consequently a great variety of options are offered at the regular selling price. Not only are the body colors optional but also the selection of the leather for the upholstery. Even the position of the seats, height from the floor, etc., will be made according to the purchaser's own ideas. Special bodies of over seventy-five styles were turned out in 1916.

Winton Co., Cleveland, Ohio

Eight-Cylinder Cars

Apperson Roadplane

AS far as size is concerned the Apperson eight motor is the same as its predecessor. However, it has been mechanically refined so that the power is materially increased. It sells for \$150 more than its predecessor. The light eight motor is constructed in blocks of four with L head cylinders and the motor is the only material difference from the chassis construction in the new six. Springs are three-quarter elliptic in the rear.

Apperson Bros. Automobile Co., Kokomo, Ind.

Cadillac

THERE are eleven body styles in the new Cadillac. Comfort is enhanced by the addition of 3-in. to the wheelbase and lighter pistons produce an even more vibrationless motor. The new models are truly luxurious vehicles. Dark blue is now the standard color on the open cars and dark green which has been standard on all models since the eight was announced, is now found on the closed cars only.

The appearance is enhanced by the adoption of crown fenders and the addition of a molding around the top of the body and new headlights which, in a general way, follow the shape of the coat of arms on the radiator. The latest addition to the mechanical parts of the car which is just announced is the installation of a tank suspended to the frame and connected with a pipe to the radiator outlet. The purpose of this tank primarily is to condense anti-freezing liquids which may evaporate in the radiator, making it perfectly practical to use alcohol only as an anti freeze solution. The radiator is sealed by a gasketed filler cap so that a vacuum is created. When the water and anti freeze solution evaporates it passes through the overflow pipe and into the tank and is there condensed. Then when the radiator cools, contraction causes a suction which brings the water and alcohol back into the radiator.

Cadillac Motor Car Co., Detroit, Mich.

Chevrolet

THE Chevrolet eight has a characteristic valve-in-the-head motor and is fitted with a double cowl body which is

the last word in body style. It is a distinctive design in that the body sides are not horizontal but gradually curve from the front cowl to the double cowl and from there to the rear. The motor is 3% by 4 and the overhead valves are carried in a detachable head.

Chevrolet Motor Co., Flint, Mich.

Cole

THE Cole line for 1917 will include four models and one chassis — a Cole-Springfield Toursedan, a Cole-Springfield Tourcoupe, a seven-passenger touring and a four-passenger Tuxedo roadster. Very few changes have been made in the Cole eight chassis since the company began the production of eights. A wide solid truss midway between the steering wheel and rear axle takes the place of the torque and radius rods, drive being taken from the rear springs. The crankshaft in the Cole motor is counterbalanced by electrically welded weights which largely prevent whipping of the shaft or slapping of pistons.

Cole Motor Car Co., Indianapolis, Ind.

Cunningham

THE Cunningham makers are now building an eight only in a high-priced car selling from \$3,750 to \$5,250. The distinctive Cunningham body is carried out in the new chassis. The offering includes four, six and seven-passenger touring cars, a roadster, a limousine and a combination car. Upholstery in the limousine will be fitted to suit the owner's taste. The Cunningham motor has the largest piston displacement of any twin motor on the market.

James Cunningham Sons & Co., Rochester, N. Y.

Daniels

THE 1917 Daniels models are a continuation of the 1916 cars with a very few changes. They will be equipped with Timken axles, Gemmer steering gears and Klaxon horns. The additions are in the way of new enclosed bodies, such as the carbriolet, the landau, brougham and the suburban Berline. The carbriolet seats three and has provision for a chauffeur in the rear. This seat folds into the rear deck when not in use. Ample carrying

space is provided. The suburban Berline may be used as a car for the owner to drive or with a chauffeur, provision being made to throw the inside into one by lowering of the glass partitions.

Daniels Motor Car Co., Reading, Pa.

Ghent

THE new Ghent 8-40 is a 120-in. wheelbase well powered car selling for \$1050. There is introduced on these cars a safety device which is a combination tail light, automatic warning signal to the car behind and license plate illuminator. Pressure on the brake pedal operates the signal. The standard wheel equipment on this car is the Parker hydraulic steel wheel with spokes of press steel, giving an assembly of very light weight.

Ghent Motor Co., Chicago

Hollier

IN the design of the Hollier eight particular attention is given to the comfort of the passengers both in the body design and in the spring suspension. The body is low with wide seats upholstered in genuine leather and stuffed with curled hair. There is an abundance of leg room in the front and rear compartments. The rear springs are forty-two inches long, of the cantilever type, making this light-weight car very smooth riding.

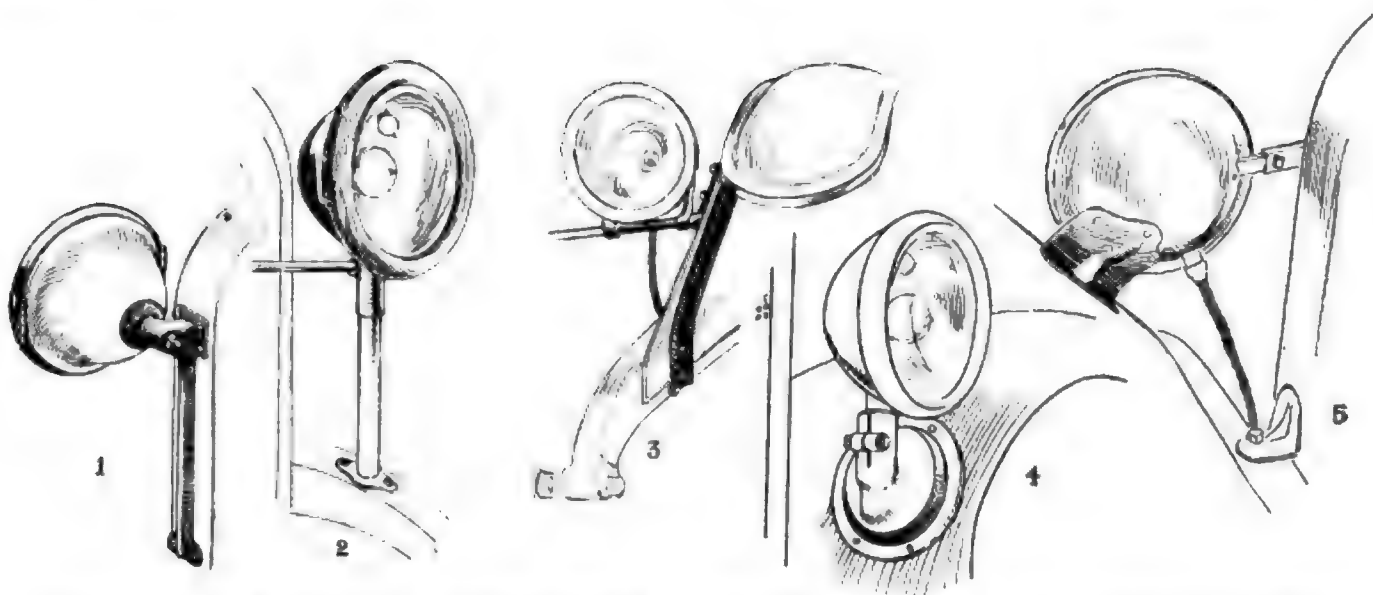
Lewis Spring and Axle Co., Chelsea, Mich.

King

THE altered body lines are at first the most noticeable change in the new eight-cylinder Kings. This change starts with the radiator, the shape of which has been altered so that it represents a shield to conform with the King trademark and this hood line is then swept straight back to the cowl and from there curved down and directed on a straight line to the front seat. The chassis is identical with the previous model except that a Stewart vacuum feed is used.

A new four-passenger body is one of the additions to the 1917 program. This car, designated as the Foursome, is characteristically in the sporting type. In the driver's compartment are two individual bucket seats, 19 in. wide and 19 in. long and the rear seat measures 42 in. wide, giving plenty of room for two passengers. There are little conveniences of detail which contribute to the comfort of the passengers. On the seven-passenger touring car a special drawer has been arranged under the front seat for carrying tools. The rear seat cowl board is of Circassian walnut and in the center of this is a light which is also a combination trouble lamp which may be taken out and carried to any part of the car. The cord is self-winding. There is a small compartment under the tonneau cowl board where small articles can be carried.

King Motor Car Co., Detroit, Mich.



Arranging the lamps on the new cars. 1. Lexington adjustable. 2. Jeffery with double bulb. 4. Case. 5. Buick stamped bracket

Murray

THE new Murray is a high-priced seven-passenger car placed on a 127-in. wheelbase chassis. The car is largely an assembled one, using a unit powerplant composed of an eight-cylinder Herschell-Spillman motor and a Covert gearset. Other parts used are Timken axles, Perfection springs, Bosch ignition, Gemmer steering gear and Blood universals.

Murray Motor Car Co., Pittsburgh, Pa.

Oakland

THE model 50 eight-cylinder Oakland will be continued for another season with practically no changes. This car is distinguished by its massive appearance and consequent roominess, its great power in proportion to the weight and its long springs which contribute materially to easier riding qualities. It carries the characteristic Oakland V-type radiator which has been used by this company for a number of years.

High lights in the specifications of this car are as follows: Aluminum pistons, underslung rear springs, three quarter elliptic 53½ in. long, 34 by 4½ in. tires all around, coach green finish with wheels and chassis black as standard, and 127 in. wheelbase.

Oakland Motor Car Co., Pontiac, Mich.

Oldsmobile

IN mechanical make up and general characteristics, the Oldsmobile 45 is a continuation of the previous model 44. Although the bore and stroke, wheelbase and general dimensions are unchanged, there are enough improvements both mechanically and in appearance to make the model quite new. The radiator is entirely new, with a distinctive fluted oval of solid German silver.

Throughout the car considerations of

comfort are predominant. The 120-in. wheelbase with a very short hood made possible by the compact eight-cylinder motor provides unusual leg room, while high body sides and deep seats give the cozy sensation of seating in, not on the car.

The Lynite pistons are continued, but under very different design, in which mechanical perfection has reduced oil pumping to the minimum. There are three rings above the wrist pin and one below and six holes are drilled in the lower edge of the bottom ring groove and six in the upper edge. There are also two opposite holes at right angles to the wrist pin.

Olds Motor Works, Lansing, Mich.

Peerless

THE Peerless eight-cylinder car will be continued for another year without change. Following current practice the price will be increased \$90, this to take effect March 1. There is no mistaking a Peerless car for any other. The familiar radiator shape which has characterized this make for a number of years is retained with alterations to make it more graceful. The body lines are massive and have the appearance of comfort and luxury.

Peerless Motor Car Co., Cleveland, Ohio

Ross

FOR 1917, the Ross eight cylinder car appears in a new dress that is in accord with the latest body fashions in every particular. The vehicle is practically the same mechanically as it was when the first model was brought out over a year ago. The modern double cowl effect has been worked out at the back of the front seat and the hood slopes into the cowl without a break. The radiator shell also slopes to the hood in a very pleasing manner. Nothing has been forgotten in the equipment of the new Ross. The list

of articles including a motor-driven horn, one man top, Stewart speedometer ammeter, extra rim and tire carrier and the usual complement of tools.

Ross Automobile Co., Detroit, Mich.

Scripps-Booth

THE Scripps-Booth is characterized by its attractive and thoroughly different bodies and its easy riding qualities. The aim in the design of this car is to construct a light weight medium-powered vehicle selling at a price high enough to include equipment of the highest grade and workmanship of the best throughout the construction.

The new eight-cylinder model, which has been produced for some time in the form in which it will be continued carries a four-passenger body with divided front seat and the lines are characteristically Scripps-Booth. Accessibility is a feature in this eight-cylinder motor. The carburetor is high where it is easily reached. The heads are removable uncovering the valves, so that carbon removing is a very simple process.

Scripps-Booth Co., Detroit, Mich.

Standard

CHANGES in the new Standard car over previous model are: 3½ by 5 motor instead of 3 by 5, Borg & Beck clutch, Grant Lees gearset, wheelbase increased from 121 to 127 in., Splitdorf magneto in place of battery ignition, and an increase of 3 in. in the length of the rear springs which gives a 56 in. overall dimensions.

Standard Steel Car Co., Pittsburgh, Pa.

Stearns

THE Stearns-Knight eight-cylinder motor, probably the first motor built in this country to incorporate a sleeve-

valve arrangement in a twin-cylinder construction, will be continued for another season with very few mechanical refinements, none of which are apparent without the use of a fine-tooth comb, and a larger body, which gives considerably more leg room in front. The price of the eight will be increased \$100, making the figure for the touring car \$2,250.

F. B. Stearns Co., Cleveland, Ohio

Willys-Knight

ONE of the mechanical features of the New York show will be the Willys-Knight eight introduced for the first time. The Toledo company is showing a seven-passenger touring car equipped with the second sleeve valve V-type motor to make its appearance in this country.

While distinctly new, there is nothing radical about the powerplant as it incorporates the features common to poppet valve twin motors and to the ordinary Knight type of vertical engine. The only feature that is unusual is that there are sixteen of the valve sleeves, two for each cylinder, driven off the eccentric shaft. Only one shaft is used, this being mounted in the center of the V above the crankshaft by which it is directly driven.

The eight cylinders are cast in two blocks of four and have bore and stroke

dimensions of 3½ by 4. Cooling is by thermo syphon, ignition by a single battery system and gasoline feed through a vacuum tank. The entire chassis layout is similar to that of the Knight four. In wheelbase, however, it is longer. This figure being 125 in., whereas on the four it is 121 in.

The body fitted to this car has a one-piece cowl and a cowl on the back of the front seat. The upholstery is hand-buffed leather. Heavy sheet-steel crown fenders are used. The body lines are very similar to the four.

Willys-Overland Co., Toledo, Ohio

Yale

THE Yale eight is a new product and for the present will be supplied only in seven-passenger form. The standard color is ivory white for the body with black fenders and trim. The attempt to reduce wind resistance to the minimum is apparent in the body design. The hood is tapered to blend well with the rather deep cowl and the sides are perfectly smooth. The windshield is smartly raked and there is a cowl at the back of the driver's seat which serves to house the auxiliary seats. All doors are fitted with pockets.

Saginaw Motor Co., Saginaw, Mich.

Twelve Cylinder Cars

Austin

AS HAS characterized Austin design since its inception a good many years ago, every part on the car is built of the best materials obtainable and with watch-like accuracy letting the price fall where it may. The most distinctive features of the new cars are the body lines, which deviate materially from the customary practice. The car has next to the longest wheelbase of any American motor vehicle, the figure being 142½ in. Austin features are two-speed rear axle, double-cantilever springs and a compact and accessible twelve-cylinder motor.

Austin Automobile Co., Grand Rapids, Mich.

Enger Twin Unit

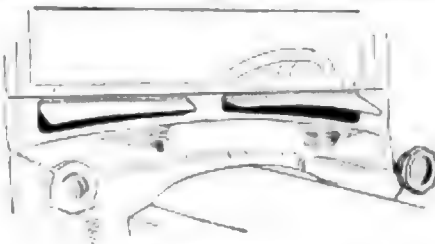
OF course, the most striking feature in the Enger twin-unit twelve is the principle whereby six or twelve cylinders may be used at the will of the driver. The principle which permits this is in merely lifting the exhaust valves in one set of cylinders and closing the intake pipe to that set of cylinders with a butterfly valve, thus putting the block entirely out of commission. The purpose of this arrangement is to afford high gasoline economy on smooth roads where the maximum power is not needed. The motor is very small size, being 2¾ by 3½ bore and stroke and one can imagine that the gaso-

line consumption is very low with only six of the cylinders operating. There is a total absence of square corners in the make-up of the Enger body. In accordance with up-to-date practice it has a double cowl and a slightly slanted windshield.

Enger Motor Car Co., Cincinnati, Ohio

Hal

THE Hal seven-passenger touring car and the roadsters follow the ultra in the latest fashion decree in body designs. There is to be found a double cowl, a rounded over top edge of the body and a straight taper from the radiator to the rear of the car. All in all these bodies give this new 135-in. wheelbase car a massive appearance. Befitting a car of its price the equipment is elaborate throughout. An interesting feature showing the completeness of mechanical detail is an efficient oiling system with an oil pump in the crankcase forcing a constant supply through individual pipes to each of the



Packard's dash ventilator

three main bearings of the crankshaft and to the camshaft bearings. The connecting rods are oiled from the main bearings through holes drilled in the webs of the crankshaft.

Hal Motor Car Co., Cleveland, Ohio

Haynes

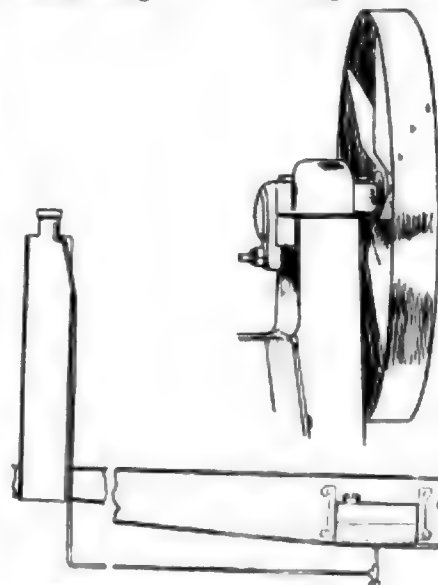
THE motor of the Haynes twelve-cylinder car is an interesting study in accessibility. It is of the overhead-valve type with all valve operating mechanism inclosed. There is nothing bulky between the cylinders except the carburetor and intake manifold and the adjustments on this carburetor are so located as to be very easy to get at. The distributor is shaft-driven and located directly behind the pair of cylinder blocks.

Again speaking of accessibility, the valves are constructed in a removable cylinder head and are arranged on the alley side of the cylinder blocks so that pushrods and valve adjustments are a simple matter. The spark plugs are set on the valve side of the block bringing all twelve of them within arm's reach. This motor is applied to the same two chassis as is the six, the motors being interchangeable. The twelve-cylinder models are known as model 40 and 41, and are set on 121 and 127-in. wheelbase chassis. The twelve is obtainable in a new four-passenger roadster body on the 127-in. chassis and in five and seven-passenger touring cars and Springfield type touring sedan.

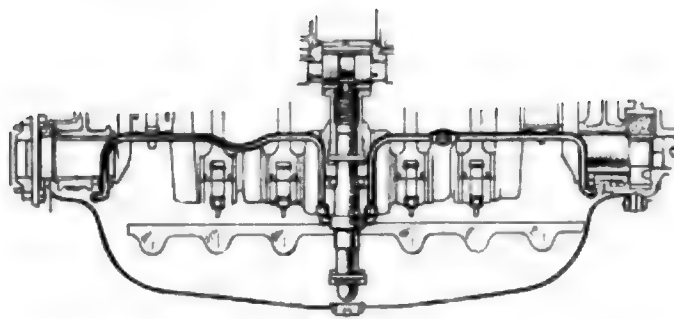
Haynes Automobile Co., Kokomo, Ind.

National

A NUMBER of detailed improvements have been made in the higher-priced National twelve. The touring body has been increased in size and now instead of being a six-passenger job, it has a full seven-passenger capacity. Probably the most noticeable change is in the design of this



White's inclosed fan drive, above, and Cadillac radiator overflow reservoir



Pump for oiling system of the six-cylinder Marion-Handley motor

seven-passenger car. Although the chassis is the same length, the new body is three in. longer and has a center cowl and an aisle between the front seats. In the tonneau under the center cowl are two locked package compartments. The front seats are larger in every dimension and there is also more room in the driver's compartment. The body is wider than in the former series and there is more carrying capacity under each of the three seats. In addition there is a tool compartment on the left front door. The fenders are an inch wider and the windshield is now slanted. The cloverleaf design, which was marketed last year as a three-passenger body, has now been made into a full four-passenger job. In addition to the four-passenger and seven-passenger models there is a four-passenger touring car, five-passenger, All-Weather sedan of the Springfield type and a three-passenger coupe.

National Motor Vehicle Co., Indianapolis, Ind.

Packard

THIS early builder of twelves is making no changes of real importance for the 1917 series. As an example of the sort of minor changes that have been made, the alteration of the cylinder castings is the most striking. Formerly the Packard had a one piece L-head cylinder casting and this has been replaced with detachable cylinder heads which do not alter the relative positions of any parts of the engine.

In conjunction with the detachable cylinder heads there has been a change in the water outlet. There are now no separate water pipes running from the cylinder heads to the radiator. Instead of these the intake manifold is surrounded by a larger pipe which acts as the water outlet for the cylinders and a single separate pipe then connects the top center of the manifold to the radiator.

Another noticeable change is the lowering of the frame 2 in. which alters the appearance of the car to a considerable extent. Packard has also abandoned the horizontal end piece on the rear mudguards. The fenders now follow the curves of the wheels. There are two lengths of chassis. The larger is 135-in. wheelbase and the smaller, 126½-in., this being an increase of 1½-in. over last year.

Packard Motor Car Co., Detroit, Mich.

Pathfinder

THE first announcement of the 1917 Pathfinder appears in another part of this issue. A disappearing top and a tire carrier of unusual design are the most striking innovations although there are a number of other changes such as an entirely new frame, new method of seat springing, and auxiliary seats mounted direct to the frame and assembled with the chassis. The gasoline tank is now located in the cowl and the new body, which in the seven-passenger model, has the appearance of a roadster, is of the sectional type. The brakes have been increased in size and minor parts strengthened. An interesting feature which aids in making the seating lower to the ground is that the floor boards rest directly on the frame instead of on a sub-structure.

Pathfinder Motor Car Co., Indianapolis, Ind.

Remarkable Economy with Wilmo Manifold

CHICAGO, Dec. 28—Increases in economy ranging as high as 54 per cent were obtained through the use of the Wilmo manifold in a series of tests recently conducted at Mishawaka, Ind., under supervision of the American Automobile Association. The tests were conducted on a Ford and on a Studebaker Six. An economy run being made first with the regular equipment as furnished by the manufacturer of the car, and then repeated under the same conditions after the stock mani-

fold had been replaced by the Wilmo combination manifold. In each case a measured gallon of fuel was placed in a special testing tank and the car run at average speeds of approximately 20 miles per hour over average city streets until the fuel was exhausted.

The Wilmo manifold is a one-piece gray-iron casting forming a combination intake and exhaust manifold. When it is applied to a motor it replaces the separate intake and exhaust manifolds originally a part of the motor and is applicable to L-head motors. The lower section of the manifold constitutes the intake and the upper section the exhaust. Between these two sections is a thin wall cast integral with the manifold and of the same material. The hot gases passing out through the exhaust section heat the intake mixture which, it is claimed, decreases the gasoline consumption because the heat brings about complete vaporization of the gasoline so that no raw fuel enters the cylinders. It has been found possible to close the needle valve from one-quarter to one-third of a turn after the manifold has been installed. It is also claimed that preignition and carbonization are prevented and that a smooth running motor is given more quickly when starting from cold because only a few explosions are necessary to heat the intake manifold. It is manufactured by the Gillette Motors Co., Mishawaka, Ind., and distributed by the Whittier Co., Chicago.

The test was made under the direct supervision of L. A. Hillman, technical representative of the contest board of the American Automobile Association.

Two tests were performed on each car, one being with commercial gasoline with the manufacturer's manifold equipment, the next with commercial gasoline and the Wilmo manifold. Also the Ford was tested with a mixture of 50 per cent gasoline and 50 per cent kerosene through the Wilmo manifold. The results of the test on the Ford follow:

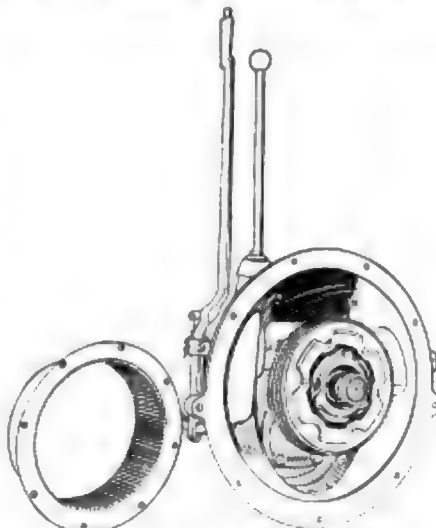
With Ford manifold and gasoline—19.6 miles per gallon.

With Wilmo manifold and gasoline—28 miles per gallon. Increase 42 per cent.

With Wilmo manifold and half gasoline, half kerosene—26.6 miles per gallon.

On the Studebaker Six, with top and windshield up, carrying three passengers and making total weight with load 3570 lbs., the use of the combination manifold showed an increase of 54.7 per cent.

Neither of these cars were new, the Studebaker having been run approximately 7600 miles, and the Ford having run 20,000 miles. The same carburetor was used in both tests, it being a Holley on the Ford and a Schebler model B on the Studebaker. In addition to the economy feature, the Wilmo manifold seemed to make the motor function properly, more quickly than was possible with the regular equipment when started from cold.

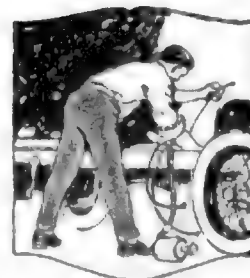


Multiple-disk clutch found in the Westcott



Electrical Equipment of the Motor Car

By David Penn Moreton & Darwin S. Hatch.



Editor's Note—Herewith is presented a special installment of a weekly series of articles which began in *Motor Age* issue of June 29, designed to give the motorist the knowledge necessary to enable him to care for and repair any and all of the electrical features of his car, no matter what make or model it may be. At the conclusion of this series, "Electrical Equipment of the Motor Car," with additions, will be published in book form by the *Class Journal Co.*, in a size to fit the pocket conveniently. It is expected that the book will be published about April 1.

Locating Common Starting and Lighting Troubles

NOTE—This is a special installment of the series published at this time in answer to a number of requests from readers. When this material is published in book form, it will appear in different form in another portion of the work.

AT LEAST 90 per cent of the difficulties encountered in the operation of modern starting and lighting systems are due to one or more of the following causes:

- (a) Battery partly or entirely discharged.
- (b) Open circuits due to broken connections, etc.
- (c) Bad contacts.
- (d) Short-circuits.
- (e) Grounded circuits.
- (f) Improper equipment.

For convenience, the various cases of trouble may be classified as belonging to one or the other of two groups and these may be called lighting troubles and starting troubles.

Lighting Troubles

No Lights, Engine Not Running

This condition is usually due to a discharged battery or an open circuit. The battery may be tested by operating the starting motor, but if the motor fails to operate do not assume that the battery must be discharged as there may be an open in the starting circuit as well as in the lighting circuit. Open the battery compartment and examine the connections to the battery to make sure they are all clean and tight. If no loose connections are found at the battery test it by means of a test lamp or voltmeter, if either is available, or by a hydrometer.

In the absence of a test lamp and voltmeter the approximate condition of charge of the battery may be tested by momentarily short-circuiting it with a short piece of wire or other conductor. If it is completely discharged, practically no spark or are will form when the short circuit is broken. This method of testing is advised only in an emergency. Should the battery be found discharged it may be due to any one or a combination of the following causes and the trouble should be located and corrected.

- (a) Short circuits in the wiring, lamps, switches, and other equipment.
- (b) Battery worn out, internal short circuit, low electrolyte, excessive lamp load, improper use of starting motor, partial short-circuit caused by acid and moisture on top of battery, etc.
- (c) Cut-out not operating properly and as a result the battery discharges through the generator.

If the condition of the battery is found to be correct, then the trouble is doubtless due to an open circuit. An inspection of the circuit may locate the trouble which may be due to a terminal coming loose, a terminal block or switch open, blown fuse, loose wires in lamp sockets, burned out lamps, broken wire, lamps loose in sockets, defective switch, and so forth. If the open circuit is not readily located by an inspection of the cir-

cuit it may be found by testing, as explained in one of the following sections.

No Lights, Engine Running

If no lights burn when the engine is running, the cause of the trouble may be any one or a combination of the following:

- (a) Circuits connected to the battery short-circuited, which also short-circuits the generator.
- (b) Open circuit between battery and lights as explained above, or an open circuit between the generator and battery.
- (c) No voltage generated by the generator, which may be due to dirty or roughened commutator, brushes stuck in holders and not in contact with the commutator, brushes not fitted to surface of commutator, no pressure on brushes so as to hold them on the commutator, winding burned out or grounded, short-circuited or grounded field coils, etc.
- (d) The cut-out and regulator may not be operating due to improper adjustment, burnt-out winding, broken connections, dirty contacts, worn-out contacts, etc.

One or More Lights Out, Others Bright

If one or more of the lamps do not light when turned on, but others do light the trouble is due probably to:

- (a) Fuse blown.
- (b) Bulb burned out.
- (c) Bulb loose in socket.
- (d) Open or ground in wire to lamp from switch.
- (e) Switch does not close.

First try the bulb by making sure it is firm in its socket and then inserting it in a socket to replace a lamp that is burning. If it does not light, the bulb must be renewed; if it does light the trouble is between the switch and the socket. Then look to the fuse. If it is correct, the trouble is between fuse block and socket and can be located by inspection for grounds or open circuits or tested as explained later.

Dim and Flickering Lights

If all the lights are dim when the engine is not running, the cause is a partly discharged battery.

If all the lights are dim when the engine is running, the cause is a partly discharged battery, or the cut-out, regulator or generator are not operating correctly.

When one or more, but not all, lamps flicker, the cause of the trouble may be due to loose connection in the lamp circuit, broken filament or the cut-out may not be operating properly.

When some lights are dim and others of supposedly the same candlepower are bright the cause of the trouble may be a poor

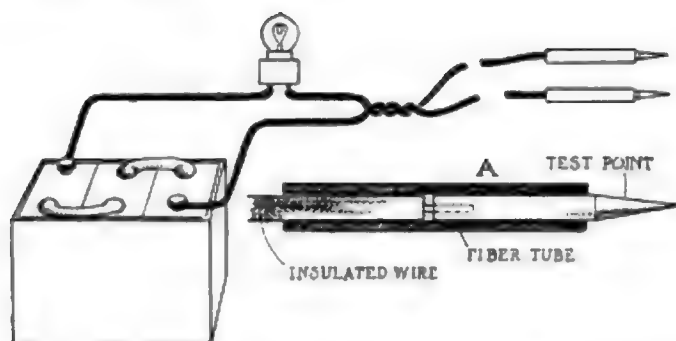
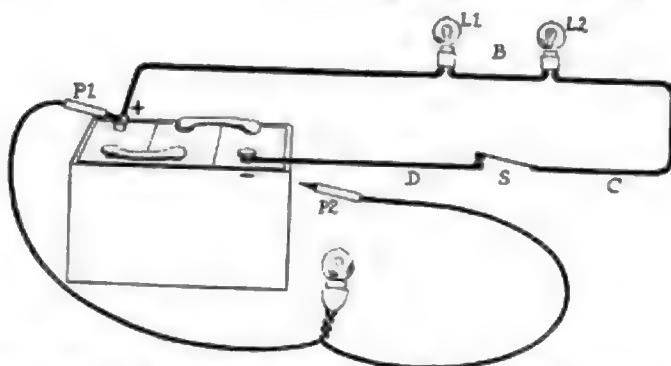


Fig. 1—At the left, a test lamp and battery for locating troubles in electric system. The battery in the car usually can be used without removing it from the car. The detail shows a special test point that can be made for repair shop use where frequent testing is necessary. For the motorist, a length of lamp cord usually will serve. Fig. 2—At the right, using a test lamp for locating troubles in a series lighting circuit



bulb, or one of improper voltage, blackened or worn out bulb, partial short circuit on some part of the lighting circuit.

Starting Troubles

Starting Motor Does Not Crank Engine

If the starting motor refuses to operate when the starting switch is closed, the trouble is likely due to one of the following causes:

- Discharged battery, which may be determined as explained above.
- Open circuits due to loose connections at battery, starting switch, motor terminals or ground connection; very poor contact in starting switch; dirty or roughened commutator; worn brushes; brushes not fitted to the surface of the commutator; improper pressure on the brushes; armature or field winding burnt out.
- Short circuits or grounds in starting switch, wiring or motor, due to insulation being worn off of the conductors by metal cleats, sharp bends around the metal covers, insulation destroyed by heat, water and grease, etc.

Starting Motor Cranks Engine Slowly

When the starting motor cranks the engine below the proper speed, it may be due to any one of the following causes:

- Battery partly discharged or very cold, thus lowering its efficiency.
- Poor contacts in motor circuit, usually at battery terminals, starting switch, contacts, or the commutator of the motor. In fact any condition which will not result in an abnormal amount of resistance being introduced into the circuit.

Simple Testing Equipment

A 6-volt lamp in a small socket and provided with testing points connected to it by means of lamp cord may be used in locating practically all kinds of trouble on a starting and lighting system when the operator is familiar with the wiring diagram of the system or has at his disposal a diagram which he can readily follow. For repair-shop use the test points may be made similar to the ones shown in Fig. 1. For emergency use, any two lengths of wire with bared end usually will serve.

How to Locate an Open Circuit

The use of the test points in locating an open circuit may be shown by taking the circuit shown in Fig. 2. Assuming you are going to use the battery in the car in making the tests you may proceed as follows: Connect one test point to the positive

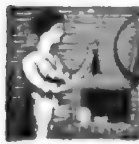
terminal of the battery and the other point to the negative terminal. With these connections made the test lamp should light up to its full candlepower unless the battery is in a discharged condition. Assuming the battery is found to be properly charged move the test point from the negative terminal of the battery to the terminal of the switch where the wire D is connected, and if the lamp lights the wire D is O. K. Next move the test point P2 to the terminal of the switch where the wire C is connected and if the lamp lights with the switch closed, the switch is O. K. Next move the test point P2 to the right-hand terminal of lamp L2 and if the test lamp burns the wire C is O. K. Next move the test point P2 to the left-hand terminal of the lamp L2. When this last connection is made the test lamp and lamp L2 will be connected in series across the terminals of the battery. If lamp L2 is O. K. the filament of the test lamp will brighten up but not to the same extent it did when connected to the right-hand terminal of the lamp. Next move the test point P2 to the right-hand terminal of lamp L1 and if the test lamp glows the same as when the test point P2 was connected to the left-hand terminal of lamp L2 then wire B is O. K. Lamp L1 may be tested by moving the test point P2 to the left-hand terminal of the lamp which puts the lamps L1 and L2 both in series with the test lamp and the test lamp may not light at all due to the added resistance in series with it. Lamp L1 and wire A may be tested by placing the test point P2 on the negative terminal of the battery and the test point P1 on the left-hand terminal of the lamp L1 and if the test lamp lights wire A is O. K. Then move the test point P1 to the right-hand side of the Lamp L1, which places the test lamp and the lamp L1 in series and if the lamp L1 is O. K. the test lamp will light, but not at full voltage due to the resistance of lamp L1 in series with it. Should the test lamp fail to light under any of the above conditions, it is an indication that there is an open circuit between the last point where the test lamp would light and the first point along the circuit where it failed to light.

Testing for Short-Circuits

Short circuits between two wires which are normally insulated from each other may be tested for with the test lamp and battery shown in Fig. 1, by placing one test point in contact with one of the wires and the other test point in contact with the other wire. If the test lamp lights it is an indication that the two wires being tested are electrically connected or shorted. In making this test be sure that the wire or circuits being tested are not normally connected. This may be determined by a thorough inspection of the wiring diagram.

NEXT WEEK

Another Special Installment Giving Practical Applications of These Methods of Testing as Applied to Several of the Common Systems



From the Woman's Viewpoint



What Women May Find at the Motor Show

SOME persons are born with opportunity. Others seize opportunity by the forelock. While still others have opportunity thrust upon them. This last might be an apt way to put the case of the prospective car buyer at the motor show. For nowhere else does the dealer or maker find himself in such exacting competition with hundreds of others at the same time and same place.

It may not be a case of now-or-never for you to attend the shows, but if you do not attend them, you will be overlooking the best opportunity you may have to learn something of cars before choosing your own or even after choosing your own, when you are ready and eager to acquire new knowledge. This applies more, perhaps, to the prospect than to any other attaché of the show. The prospect is a person of leisure with "I don't like this" and "Why doesn't it do this?" not only permitted but listened to with respect and answered with the conviction of the worth a particular make may possess.

No doubt you would find it confusing to try to sample all the information at the show, but if you have in mind a certain make or if a model on exhibit promises satisfaction, you will have opportunity to know it before you are committed to buy. Choosing is simple when you keep a few points in mind and no woman need bear out the tradition that a pretty coat of paint makes up for a balky engine if she selects with other considerations in mind.

Should Have Thorough Demonstration

The safest way is to get a good, all-around demonstration of the car before buying, and if you are buying for your own driving it would be well to determine just what comfort the driver's seat, levers and so on will give you. Get into the driver's seat and experiment to see whether you can reach the levers easily. Try the brakes. Work the clutch. See how much strength they take, and if they take a very large portion of your total strength look further. For you will never be able to get the pleasure due you from your own car if you have to work too hard to run it.

It wouldn't be a bad idea to see if you could change a tire, to take it off and put it on at least, and a good time to try it would be when you have a competent instructor to direct you. You usually have that kind when you are buying a car, but you more often have the free advice that gets nowhere when you try changing a tire for the first time out on the road, alone.

Let the salesman ramble on about the speed and the high gear success if you

have plenty of time. But don't stop there. Have him show you some of these remarkable performances in actual trial on the straightaway and hill. Find out whether

Feminine Motor Notes

SAINT LUCIE County Federation, an organization of Florida women, has decided to offer to raise and present, free of cost to the county, all the trees and ornamental shrubs needed for planting along the Dixie highway in the county. Only three of the clubs represented in the federation are on the highway, but all are working for the project. The red, white and blue colors of the highway are to be embodied as far as possible in the plants. Each club has pledged itself to a share of the mileage. The women will give the material; the county will do the planting and watering.

The Woman's Auxiliary of Bibb County, Macon, Ga., has planned a toll day, at which time they will try to find out just how many persons actually use the roads of the county in one day. The plan is a part of the good roads activities of the organization.

Where is your blanket now? It has been suggested that Northwestern women who motor have been using the scissors recklessly on the family blankets since the motor coat made of the new blanket cloth in white with wide stripes has come into vogue. The stripes come in yellow, gray, red, brown and blue and are very popular.

Miss Laura K. Kennedy has charge of the county headquarters in the Chicago offices of the Associated Roads Organizations of Chicago and Cook County and the Illinois Highway Improvement Association, which were opened lately. Miss Kennedy was the first woman in Illinois to assist at a good roads dedication, which was at Highland Park in 1914, when part of Sheridan road was opened. She will try to obtain the support of Illinois women in good roads activities.

Another in-spite-of-the-winter-season trip was made recently by two Detroit women, Mrs. W. G. Smith and Miss Margaret Easton, from New York to Detroit. Miss Easton herself drove the car, her own, part of the way. The drive was made in snowstorms with rough going along part of the route with no mechanical troubles.

you'll be risking your neck when your car is stopped or stops while climbing a hill. If you want speed have the demonstrator do the stepping on the accelerator first. Learn how flexible the car is in traffic such as might be encountered in ordinary driving.

Upkeep should be considered in selecting. The car that is the best you can buy is not always the one for which you can pay the most cash. The ultra-extra lines and finish of a car may please you more than the super-engine, but any admonition as to the superfluity of exterior appearance alone is itself superfluous. Any discriminating woman can select a good exterior if the chassis is given, or scorn one if the chassis is lacking in some essential mechanical feature. Anyway the maker today gives so much thought to the exterior that it would have to be a very poor car to have a very poor exterior.

Noisy Engine Means Trouble

Women, perhaps, are the first to prefer a quiet, smooth-running motor and for this reason are apt to pick out a car with a well-made and well-designed motor if proper demonstration is made. A noisy engine is avoided with poetic justice, for it is an imperfect engine. Have the motor run at different speeds, even if the car is standing. If the car vibrates very much, the motor probably is imperfect. The more it vibrates the quicker it wears itself out.

Accessibility undoubtedly is one thing the woman should look for, especially if she expects to be able to tinker with the inwards of her car. Many other things could be put before the woman who seeks her car. She will have countless other things put before her if she attend the motor show. Any point looking toward greater safety, comfort and pleasure should be heeded particularly, for to accomplish the end of motoring safely, comfort and pleasure are fundamentals. The engine, the body in general, the brakes, the gear levers, the clutch, the lighting and signaling system—all these are points the woman can consider and consider effectively in choosing a car.

Unless she is of a mechanical turn of mind she will not go much further in regard to the general technique of the motor car, but these are matters that all who pretend to drive a car should know before buying even. When she comes to learn to drive, that is another question and one involving consideration of other parts of the car, such as the transmission, universal, steering gear, throttle and spark and other more detailed points.



The Readers' Clearing House

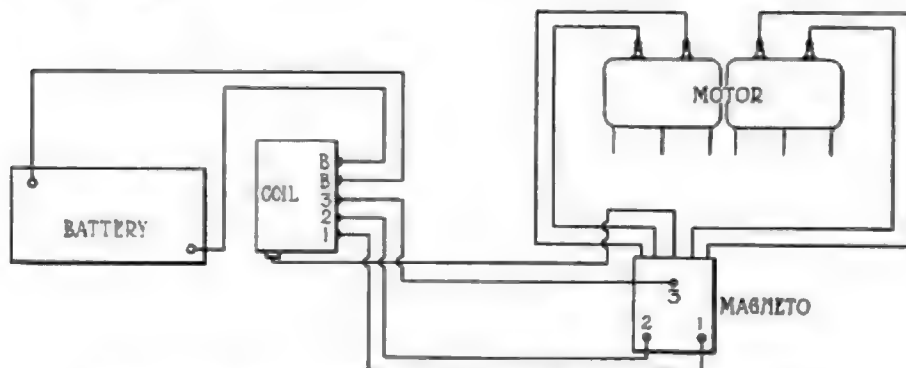


Fig. 1—Wiring diagram showing Briggs magneto installation on Michigan four-cylinder car

ENGINEERING SOCIETY BENEFITS List of Qualifications Necessary to Become Member of S. A. E.

AUGUSTA, Wis.—Editor MOTOR AGE—Kindly give me some information as to the qualifications necessary to become a member of the Society of Automobile Engineers, and what are the benefits?—George E. Wamer.

The membership of the society consists of honorary members, members, associate members, punior members, affiliate, student and international members. Honorary members and members are entitled to vote and hold office. Associate, junior, affiliate and international members shall not be entitled to vote nor to be officers of the society but shall be entitled to the other privileges of membership.

The member grade, which is of course the greatest, is composed of persons 26 years of age or over who, by previous technical training or experience or by present occupation are qualified to act as designers or constructors of complete motor vehicles or the component parts or equipment thereof; or to exercise technical supervision of the production of materials of engineering construction; or to take responsible charge of motor car engineering work, or to impart technical instruction in motor vehicle construction and operation.

The associate grade is composed of persons 26 years of age or over who are engaged in the motor car and related industries in a responsible commercial or financial capacity or who are connected with the motor car or related industries as to be competent to co-operate with motor car engineers.

For all grades it is necessary to give a prescribed number of references among present society members and the candidate is passed upon by the membership committee.

The benefits to those who are seriously interested in the engineering phase of the motor car industry are manifold. The society has sections in localities where the industry is well represented and these sec-

tions have monthly meetings at which technical papers are delivered by the best engineering authorities in the industry. These papers are published in the monthly S. A. E. Bulletin. There is a fraternalism and exchange of ideas which passes through an organization of this kind which has an immense effect in the development of the mechanical features of motor cars, and no engineer can expect to keep thoroughly posted on the most modern ideas and trends unless he be a member.

REBUILT FORD USED IN RACING Stubby Job of Light Weight Is Said to Be Capable of 72 m.p.h.

HOPE, Idaho—Editor MOTOR AGE—I inclose picture of myself in a one-time Ford, Fig. 4, which I rebuilt myself and have campaigned in southern Idaho and Missouri. This car has attained a speed of 72 m.p.h. on a straightaway.

The motor is equipped with Lynite pistons, speed camshaft, Bosch magneto and Rayfield carburetor. The wheelbase is 76 in. and the tires are 30 by 3 all around. The frame is underslung in the rear and the whole frame has been lowered 4 in. The gear ratio is 3 to 1.

1—What is gained by narrowing the tread of a racer?

2—What percentage of power is lost through

a gearset of the sliding gear type when it is in high gear?

3—What makes of gearset are manufactured that do not turn the countershaft when in high gear?

4—At what distance from the center of the crankshaft is the center of gravity in the Ford motor?

5—Where can I purchase a counterbalanced crankshaft for a Ford motor?

6—What companies manufacture overhead-valve heads for Fords?

7—After removing the magnets from the fly-wheel is it necessary to put cups on to let the oil into the oil tube?

1—No racers which have made creditable showings for a number of seasons have very narrow tread. Therefore, it is reasonable to assume that there is no advantage in reducing the width much from standard.

2—Depending on the bearings. If the bearings are of the ball or roller types and everything is in proper adjustment the frictional resistance is practically negligible. Even with solid bearings this factor would not approach a 5 per cent power loss.

3—Answered by letter.

4—It is impossible to extract technical information of this nature from the Ford factory.

5—We have nothing in our records that shows a maker of such a part.

6—T. R. Noonan Mfg. Co., Paris, Ill.

7—We have seen instances where there was nothing inserted and the oiling seemed to be conducted as good as ever. We would venture to say, however, that it would be safer to use some kind of dipper in place of the removed magnets.

Alloy Pistons in Fords

ANITA, Ia.—Editor MOTOR AGE—Are aluminum-alloy pistons and connecting rods a success in a Ford? Will they stand up? There are no rabbit or bronze bushings in the pistons or connecting rods?—F. Rhoads.

Aluminum-alloy pistons are successful in any make of car providing they are properly fitted and are of such construc-

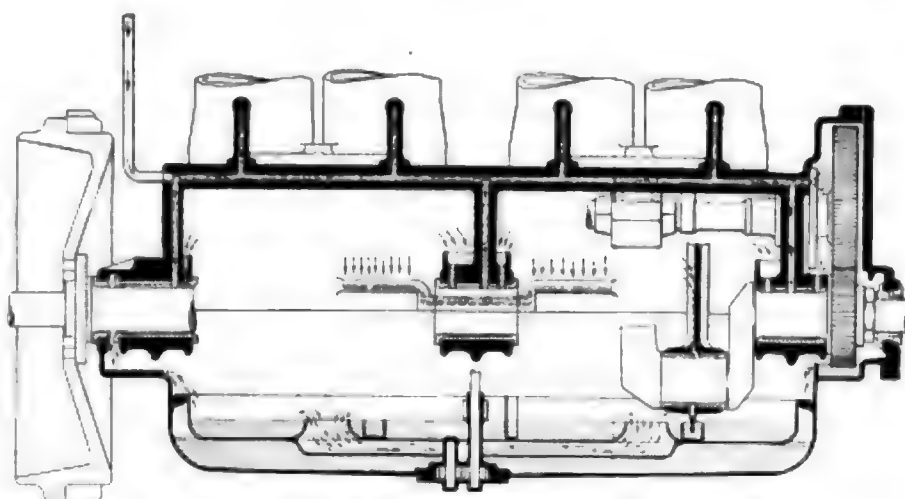
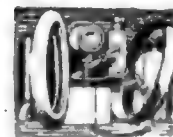


Fig. 2—Diagram of oiling system in 1913 National roadster motor



The Accessory Corner



To Lengthen Accessory Life

A PATENTED rust proof process to be applied to all metal parts such as bumpers, spark plugs, etc., before the parts are nickel-plated or enameled has been adopted by the Emil Grossman Mfg. Co., Brooklyn, N. Y., maker of the Red Head spark plug. The idea has been developed to lengthen the life of the motor car accessory, to prevent waste of material by rust and to give a better appearance.

Lever Operate Vincent Wheel

In a description of the Vincent Clear-Room steering gear given in MOTOR AGE for Nov. 16, reference was made to the operation of the wheel by a button, which it is felt might mislead one into believing that a mere touch of a button would release the wheel. As a matter of fact there are two hooks, or levers, which must be operated simultaneously in order to drop the wheel.

Bumpers for Every Car

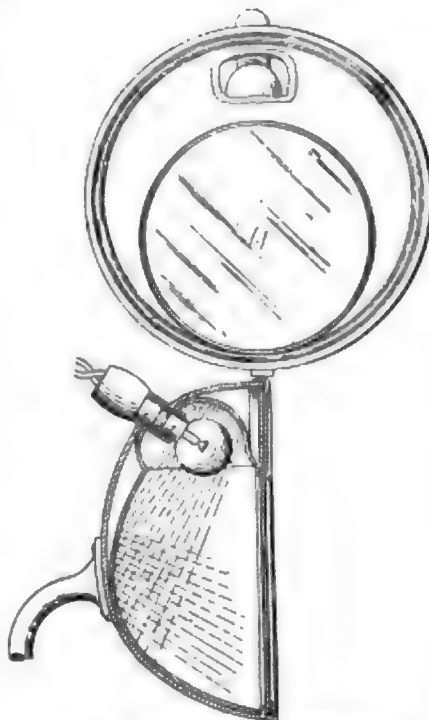
A new line of bumpers includes the diamond bar, channel, round bar, deep channel and spring, all fitted with brackets that may be attached to practically all cars. The "Truly Universal" is designed for any make having semi-elliptic front springs and the usual frame construction that goes with them. It is a clamp-on style. Several other models are for special cars, such as Packard, Chevrolet and so on. A line of rear tire holders and of running board holders in several different styles for Fords are marketed also. Au-To Compressor Co., Wilmington, Ohio.

An Adjustable Tire Holder

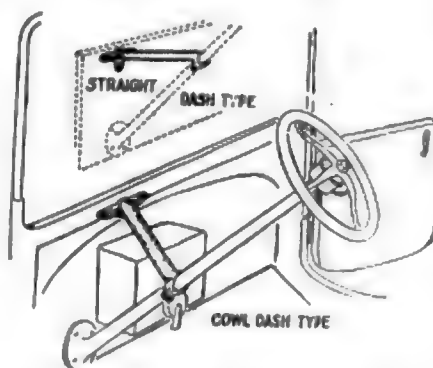
The Wilson tire holder is designed for instantaneous attachment to Ford cars and has five adjustments: Horizontal, for distance from car; angle, to conform with body; vertical, for height of tire from ground; lamp and license bracket; and tire lock, for tires of different sizes, with or without demountable rims. The holder is fastened to the rear cross bar of the frame by two U bolts and tie plates, the latter grooved to provide a positive lock on the channel steel side bars. Attachment is made without cutting or drilling or in any way interfering with the car frame or body. Rolled and bar steel are used for the construction, and the tire rests on its entire lower surface, lessening wear. The locking device is a hinged hasp that loops over a fixed lock bar securely riveted to the carrier, the bar having four lock holes for 3 or 3 1/4-in. tires. It is marketed by F. W. Stewart, Chicago.

New Three-Piece Universal Joint

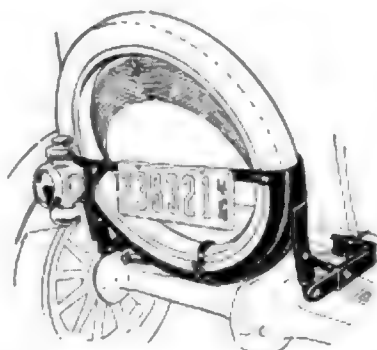
The Plank Flexible Shaft Machine Co. is preparing a new three-piece universal joint with only three working parts, the



A newly patented construction designed to eliminate headlight glare. Although this is a replica of the patent drawing, it is quite evident that the lines of refraction are incorrect



Steering column brace that also prevents excessive vibration



Wilson rear tire holder which has five adjustments

center-block, one slip-end shaft yoke and one transmission flange yoke. These parts will be inclosed in a pressed steel grease-tight metal housing. The company claims approximately five times the bearing surface of any other type of universal joint on the market and, consequently, longer wear for the parts. Lubrication is through the method of centrifugal force which distributes the lubricant from the dead center portion toward the bearings. The bearings are housed in by a grooved yoke construction which retains the lubricant at all times. A patented design is used in locking the center-block within the grooved yoke housing. The Three-Piece Universal Joint Co. has been formed and will make different sizes to care for jobs other than pleasure cars and commercial vehicles also.

To Eliminate Headlight Glare

A patent has recently been granted to M. A. Leigh, 5118 Bryan Street, Dallas, Tex., covering a headlight construction which is designed to eliminate glare, at the same time projecting the beams in front of the car in the most desirable location. As shown in the illustration the bulb is located in a sub-lamp in the top of the shell. The rays are directed from this compartment to a reflector located in conventional manner and thrown ahead. The direct glare caused by the reflection direct from the bulb, as is the case in ordinary parabolic types, is thus eliminated, according to the claim of the inventor.

Apco Specialties for Fords

In a booklet containing specialties for Ford cars, the Auto Parts Co., Providence, R. I., offers several accessories for the Ford car. A spark and throttle lock at 60 cents is made from solid brass with nickel steel clasp. Two keys are furnished, and the company claims the lock will prevent anyone starting any Ford. Its operation is easy. A steering column brace supports the steering column and prevents the base from becoming loose at the dash. It also prevents excessive vibration of the steering wheel. The brace comes in two styles, one for cars with the cowl dash and another for cars with the straight dash, and is finished in black enamel. Price, \$1.



Apco spark and throttle lock for Ford cars

From the Four Winds

LEHIGH Valley Show—The third annual Lehigh valley motor show will be held at South Bethlehem, Pa., Feb. 19-24 in the Coliseum. The annual truck show will follow 2 days later.

Roads Committee for Club—The good roads committee of the Detroit board of commerce will be transferred to the Detroit Automobile Club to carry on good roads work in the name of the latter organization.

May Bond Motor Car Owners—The Kansas legislature is to consider requiring a bond of every motor car owner in the state, so that anyone injured by a car can recover full damages. The argument is that many owners have insufficient resources to pay indemnity for accidents for which they are liable and that few of them carry insurance.

Circuit Riders for Clubs—Missouri has adopted a novel scheme in prosecuting the good roads propaganda undertaken by the new Missouri Motor Association. A series of meetings is held on a circuit, at which meetings officers of the association are present and speak. At each place auxiliaries of the state body are formed.

Fifty-Two at Baltimore Show—Fifty-two dealers will exhibit at the Baltimore motor show Jan. 23-27. Positions have been allotted. One of the large companies, the Maxwell Motor Co., will not have space at the show but will hold an exhibit of its own in its large show room. Commercial vehicles may be exhibited, though some of the dealers are opposed to it now. If not admitted to the armory the commercial vehicle dealers plan to hold shows in their places of business.

Kansas Good Roads Campaign Hot—So aroused is Kansas in general over the subject of good roads that the position of chairman of the committee on roads is one of the most popular ones in the legislature this session. Several bills affecting good roads work are to be introduced. The Topeka, Kan., Automobile Club, however, is urging amendments rather than an entirely new law. One of the amendments to the Hodges law now in effect probably will be a redistribution of the expenses of roads—making the county pay half, the township one-fourth and the benefited district one-fourth.

Oklahoma Dealers to Use Tent—So great has been the demand for space at the motor show to be staged in Oklahoma City Jan. 23-26 that a large tent will be used for the overflow of commercial cars and accessories. The principal part of the show will be in the auditorium, the interior of which will be decorated to represent a Japanese tea garden. This is the first mid-winter motor show in this territory. George W. Woods, who staged the 200-mile road race and other events in 1915, is manager. The Oklahoma City Motor Car Dealers' Association is sponsor.

Bloomington, Ill., Dealers Unite—The motor car dealers of Bloomington, Ill., have formed an organization with Joseph Lockwood as president and Frank Cole as secretary. Twenty firms joined at the first meeting, and the rest are expected to come in later. The association intends to maintain an active organization, holding meetings once a week with luncheon at a downtown hotel, and committees will try to keep up interest and enthusiasm. All motor car and accessory dealers, garage owners and those who do any kind of repair business in the line of cars, tires and so on have been asked

to join. The establishment of a clearing house for used cars is being considered. The association also will offer to take over the management of the annual dealers' show, now in the hands of the McLean County

Coming Motor Events

RACES

—1917—

May 19—Metropolitan Trophy, New York speedway.
 †May 30—Indianapolis speedway.
 †June 9—Chicago speedway.
 June 23—Cincinnati speedway.
 †July 4—Omaha speedway.
 †July 14—Des Moines speedway.
 †July 28—Tacoma speedway.
 August 4—Kansas City speedway.
 †September 3—Cincinnati speedway.
 †September 15—Providence speedway.
 †September 29—New York speedway.
 October 6—Kansas City speedway.
 October 13—Chicago speedway.
 October 27—New York speedway.

†A. A. A. championship events for 1917.

MEETINGS

January 9-11—Midwinter meeting, Society of Automobile Engineers.

SHOWS

December 30-January 6—Cleveland, Ohio, show.
 January 2-10—Salon, Hotel Astor, New York.
 January 5-11—Milwaukee, Wis., show.
 January 6-13—New York show.
 January 12-20—Philadelphia show.
 January 13-20—Montreal show.
 January 14-16—Rockford, Ill., show.
 January 19-24—Manchester, N. H., show.
 January 20-27—Detroit show.
 January 20-27—Montreal, Can., show.
 January 22-27—Oklahoma City show.
 January 22-27—Rochester, N. Y., show.
 January 23-27—Allentown, Pa., show.
 January 23-27—Baltimore show.
 January 25-27—Asheville, N. C., show.
 January 27-February 3—Chicago show.
 January 27-February 3—Columbus, Ohio, show.
 January 27-February 5—York, Pa., show.
 January 28-February 3—Wilmington, Del., show.
 January 29-February 3—Buffalo show.
 February 3-10—Minneapolis show.
 February 5-10—Bangor, Me., show.
 February 10-17—San Francisco show.
 February 10-17—Hartford, Conn., show.
 February 12-17—Kansas City show.
 February 12-17—Louisville, Ky., show.
 February 13-16—Grand Forks, N. D., show.
 February 13-17—Sioux City, Ia., show.
 February 14-17—Peoria, Ill., show.
 February 19—Pittsfield, Mass., show.
 February 19-24—Bridgeport, Conn., show.
 February 19-24—Des Moines, Ia., show.
 February 19-24—Duluth, Minn., show.
 February 19-24—Grand Rapids, Mich., show.
 February 19-24—St. Louis show.
 February 19-24—Syracuse show.
 February 26-March 3—Omaha, Neb., show.
 March 1-3—Urbana, Mich., show.
 March 3-10—Boston show.
 March 6-10—Fort Dodge, Ia., show.
 March 14-17—Davenport, Ia., show.
 March 14-17—Mason City, Ia., show.
 March 18-23—Cedar Rapids, Ia., show.

Automobile Club. A bad debt list will be prepared for benefit of members.

New York to Consider Bills—Two bills to be presented to the New York legislature propose radical changes in motor vehicle laws. One provides for universal traffic regulations, and the other amends the motor vehicle law to provide that every driver of a car, whether owner or not, must first obtain a certificate from the secretary of state; that any person can file complaint against reckless or improper driving; and that the secretary of state shall be represented at hearings, having the right to revoke the offender's right to drive a car if the complaint is sustained.

Humphrey Heads Road Federation—D. S. Humphrey, Cleveland, Ohio, has been elected president of the Ohio Good Roads Federation to succeed Jesse Taylor, Jamestown, who died recently. Mr. Humphrey was treasurer. O. J. Demuth, New Philadelphia, succeeds him.

Where Tire Rubber Grows—A rubber tree in full maturity produces from 2 to 5 pounds of rubber a year. Usually about 100 trees are planted to the acre. Time was when Brazil was the crude rubber center of the world, but today the plantations of the Far East are producing four times as much rubber as the forests of the Amazon. So your tires may be very Oriental indeed.

Tires Enter Norway Thus—Norway gets its tires in an indirect way. All are imported through London, where they are consigned only to the Royal Automobile Club of Christiania under an arrangement made with the British authorities. For every new tire delivered an old worn-out one must be turned in to the club. Evidently this is a club with which it pays to stand in well.

Stolen Cars in Chicago—A tabulation of crime for 1916 shows more motor cars were stolen in Chicago during 1916 than in former years. Ten per cent of the cars were reported unrecovered. In 3 months 1,000 were taken, the total since January being more than 3,000. Part of the increase is attributed to the increase in number of owners. Several gangs of car thieves were captured during the year and sent to the penitentiary. Of the \$2,000,000 loot, \$300 was for cars not recovered and \$50,000 for motor car accessories.

Where Cars Leap Cliffs—The cliff often has figured in fiction as the scene of the lover's leap to join the sweetheart in death or the villain's fall to justice, but one of our foreign neighbors carries it further and makes cars leap the cliff to escape falling into the hands of others. Serbia had pressed cars into service when the probability of their falling into the enemy's hands became apparent. Rather than have this happen, cars by the score were opened up on a road with a right angle turn and a sheer drop of 400 ft. to a stream.

New Oregon Roads Law Perhaps—If the law to be introduced at the coming session of the Oregon legislature is adopted, motor cars will bear twice the present tax burden, and all the net proceeds from motor vehicle taxes will be used for the construction and maintenance of roads. Motor vehicles will be classed in two divisions, pleasure cars being taxed according to weight and horsepower and motor trucks according to horsepower, weight and maximum carrying capacity. Now all motor vehicles are taxed according to horsepower, the minimum tax being \$3 and the maximum, \$10. The new law would tax the smallest cars \$5 and raise the maximum to \$25.

MOTOR AGE

Gotham Opens Show Circuit

By Darwin S. Hatch



Palace Show Finer Than Predecessors—High Record in Cars Exhibited

NEW YORK, Jan. 7.—The New Year in motordom was officially inaugurated this afternoon at the Grand Central Palace when the strains from a bugle announced the throwing open of the seventeenth annual national motor car show. It has become a matter of custom each year at this time to say that the present exhibition at the Grand Central Palace outshines, in point of number and quality of exhibits and in interest and quantity of attendance, all preceding exhibitions. This year the trite saying must be repeated.

In point of actual number of motor cars and chassis the show is ahead of a year ago. There are 339 cars on display, which is fifteen more than last year. Motor cars this year have again encroached on territory previously allotted to accessories and have welled up from the third floor, which was their limit a year ago, to the spaces on the fourth and last floor of the Palace devoted to the exhibition. There are now cars on four floors. Mostly from lack of space the accessories, accordingly, are more in the minority than they have been previously. There are 27 exhibitors of accessories on the third and fourth floors, only three fourths as many as a year ago.

The opening at 2 o'clock this after-

noon was an impressive one. The formal address of opening was made by Francis Hugo, secretary of state of New York, as the official representative of the only state in the union boasting of over 100,000 cars. Secretary Hugo was introduced by Col. George Pope, veteran and the father of motor car exhibitions in America.

Before the doors were thrown open to the public there was an immense crowd waiting for admission, larger, it seems, than those which witnessed the premier of other years.

As usual the Saturday afternoon and night crowds were record crowds. No sooner had the entrances been thrown open than the aisles began to fill up and in less than an hour every floor was more than comfortably crowded. Just nighters at the motor shows as a rule, but without rest, the tendency usually being to look the gift horse in the mouth. Today, however, the vastness seemed to excite special interest in a number of features, the new steamers, the motor cycles, engines, and some of the striking body designs claiming most immediate attention.

In spite of rain all day Friday, the exhibits were many, when the doors opened and composed a well planned gallery of shows as the setting for the



Cardinal Colors Well Mixed

Vivid Shades, Moths of a Year Ago, Now Well-Developed Throughout Car Field

IT is questionable if at any previous New York show there has been such a galaxy of bright-colored cars as are seen this year. Heretofore we have expected a few of the leading manufacturers to have a show car in bright yellow, green, blue, white, or other combinations, but we have not looked for such jobs scattered all through the show and particularly with manufacturers

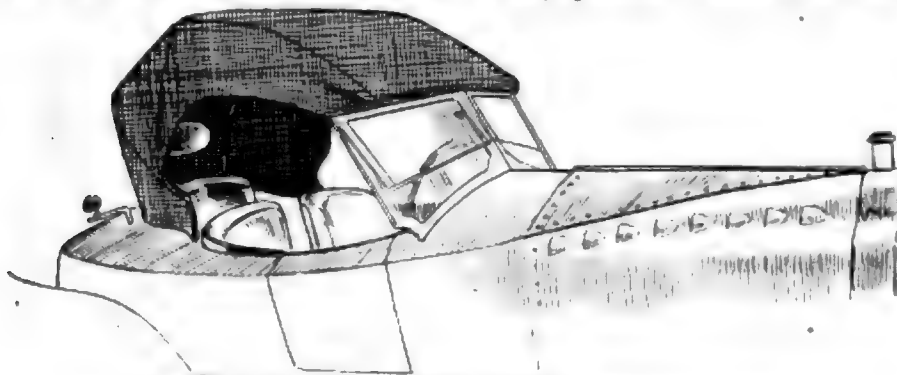
of low-priced cars. This year the show-body movement has spread on to every floor of the Grand Central Palace.

These show bodies are more rational than in former years. You do not see so many interiors finished in delicate pinks, blues, and whites, more looked for in the boudoir than in a motor car. This year there are lavishly-upholstered interiors with costly

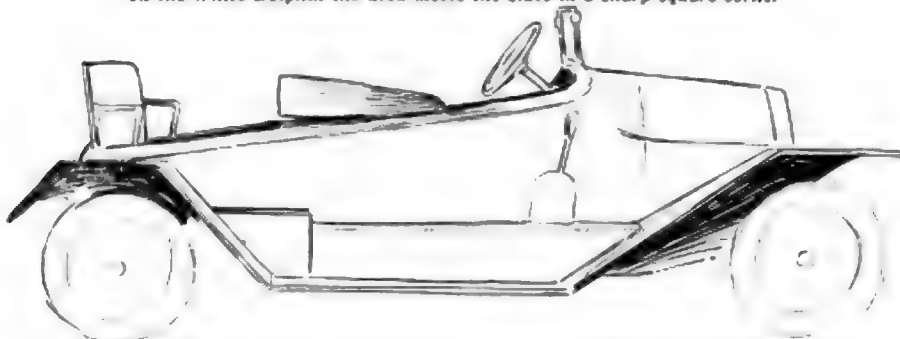
tapestries and silks, but they are more usable. It is true that nearly all of these show jobs are in colors that are not regularly listed as stocks and often several hundred dollars is added to the cost. Studebaker occupies the interest center with its gold and white car on which it is stated \$30,000 has been expended in precious metal. The car with victoria top is an art job. It is always surrounded with an admiring throng.

After studying all of the exhibits you are convinced that more thought has been expended on body designs than has been usual in former years, notwithstanding the pressure production has imposed on car makers. There are some really brilliant designs, bodies that stand out conspicuously in different respects over all others. These bodies show special thought. One maker has set about to look after personal comforts more than ever before. Another has aimed to accomplish certain ends, such as carrying the tires and top within the body. Another has endeavored to give the most comfortable seven-passenger job. Another has confined his efforts to the most practical four-passenger style. The work of another has been to develop the best Springfield type. So it is throughout the show, different makers excel in different departments.

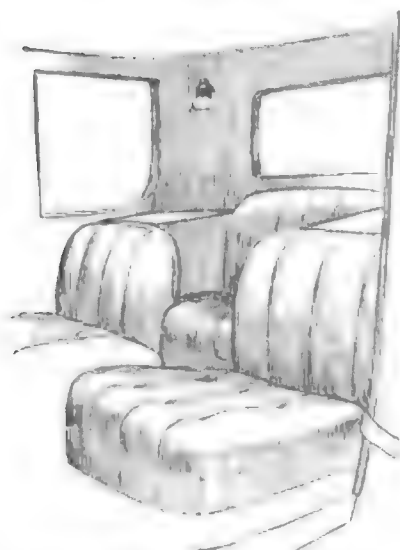
The preponderance of four-passenger runabouts, which are a development of the clover-leaf design of last year, is one of the dominating designs. You meet such a car in practically every exhibit. You do not see the three-passenger cloverleaf of a year ago, except in a coupe. It is now all four-passenger jobs with the front seat divided and an aisle between to reach the rear seat. The rear seat is generally wide enough for two passengers, but there is



In the White Dolphin the deck meets the sides in a sharp square corner



An exaggerated form of the low sloping rear is shown in this Lancia hydroplane roadster

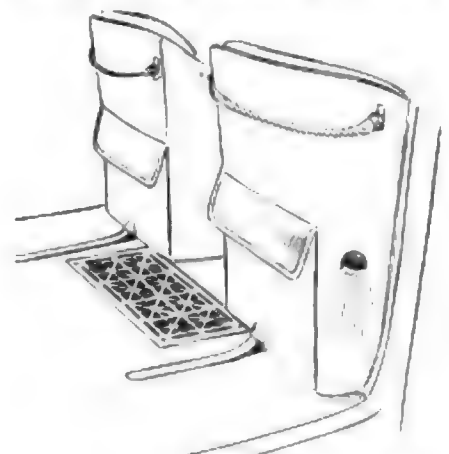


Comfort has been made a predominant feature in the White sedan



This town car is one of the hits of the show. It is very simple, with perfectly square corners and devoid of molding

The Phianna cantilever spring is covered with leather. There is a mud apron behind



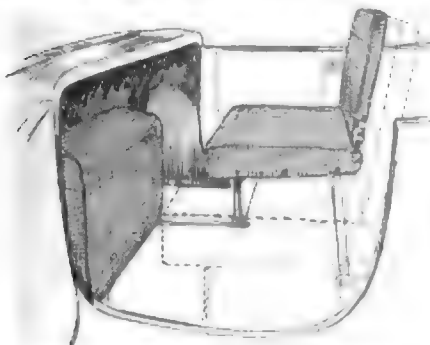
A heater is installed in the Ben Hur open sedan

rarely enough knee room. The back of the seat is generally too low. These designs are good as emergency runabouts, but they cannot possibly take the place of a four-passenger touring car in which you would take a 500-mile trip with four people and necessary baggage. There is not room for a small hand grip, except in the aisle between the front seats. There is not space for carrying robes or rain coats. These designs are generally hopelessly lacking in baggage-carrying capacity. With three passengers in them there is sufficient room for a suitcase, a robe and extra clothing.

In the field under \$1,000, Saxon and Allen have two particularly roomy designs of four-passenger roadsters. There is more knee room than in many of the larger makes. Their design suggests that several manufacturers can, without increasing the wheelbase, secure more space for the rear passengers and provide accommodation for such necessities as extra coats, robes, etc. **Few Four-Passenger Touring Cars**

The out-and-out four-passenger touring car is conspicuous by the few concerns exhibiting it. Mercer, National and Premier merit special mention as having attractive jobs in this division. The Premier might be classed as a close-coupled type as compared with Mercer and National. All three are commendable designs, and have good baggage capacity inside the body. In this respect National leads with a compartment in the back of the front seat in which one or two suitcases can be carried. Above this are two smaller compartments for veils, scarfs, gloves, guide books and other touring essentials. This body is a real effort towards making a touring car something more than a vehicle with seats for the passengers.

The Mercer might perhaps be classed as having one of the best touring body designs in the show, and one which has more imitators than perhaps any other. It represents that streamline design with a center cowl, but not having the top side lines of the body straight from the front cowl to the rear seat. Rather there is a suggestion of downward concave curve between the front cowl and the center cowl and also between the center cowl and the rear of the tonneau. This effect gives the center cowl the appearance of the crest of a wave.



Spacious folding seats of the Hupmobile, which when unfolded extend to the whole width of the car, affording room for three

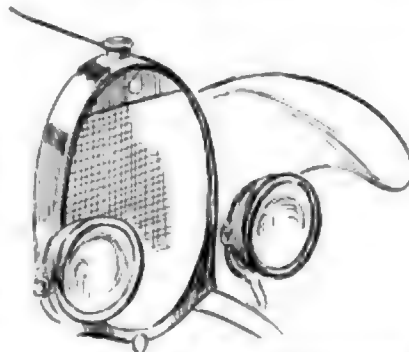
It might be permissible to designate this modification of streamline design as wave line, as opposed to straight line as exemplified in the National four-passenger. Go through the show from top to bottom and practically all touring cars fall into either of these classifications, namely, the straight-line top or the wave-line top.

Hupmobile merits particular recognition as having a seven-passenger job with two of the most comfortable auxiliary tonneau seats at the show. These seats are larger and wider than others. They are very comfortable and when both are opened up furnish practically a continuous seat from side to side which will accommodate three

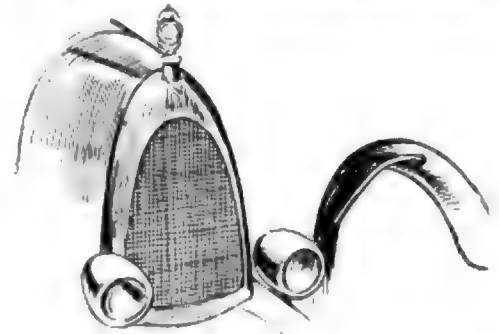
passengers. These seats fold under the center cowl where there is sufficient space back of the front seats to conceal them. The cowl affords adequate protection for them and no effort is made to conceal them with curtains.

In the five-passenger touring field the new Liberty is coming in for very general comments on its well-proportioned design from radiator to tonneau. Its design follows the Rolls-Royce school of straight-edge radiator and hood lines as compared with expanding curves so dominating this year. Body and hood proportions have been very well weighed in this job.

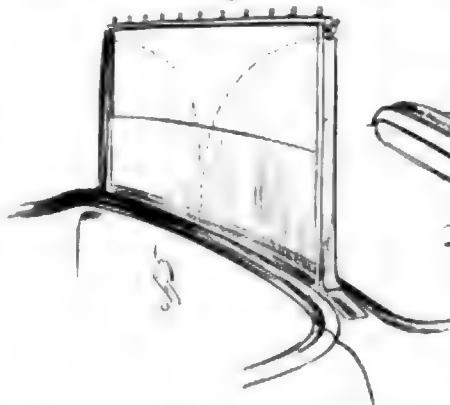
In the strictly two-passenger runabout



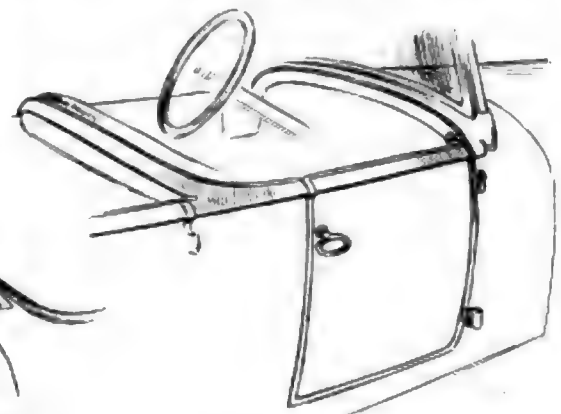
The radiator of the Brewster is oval in shape



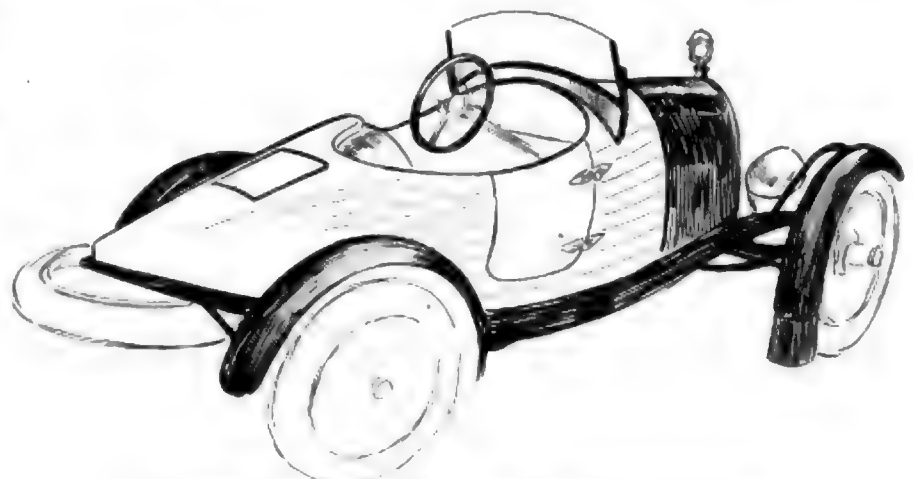
The Novara is almost in a class by itself with this type of radiator



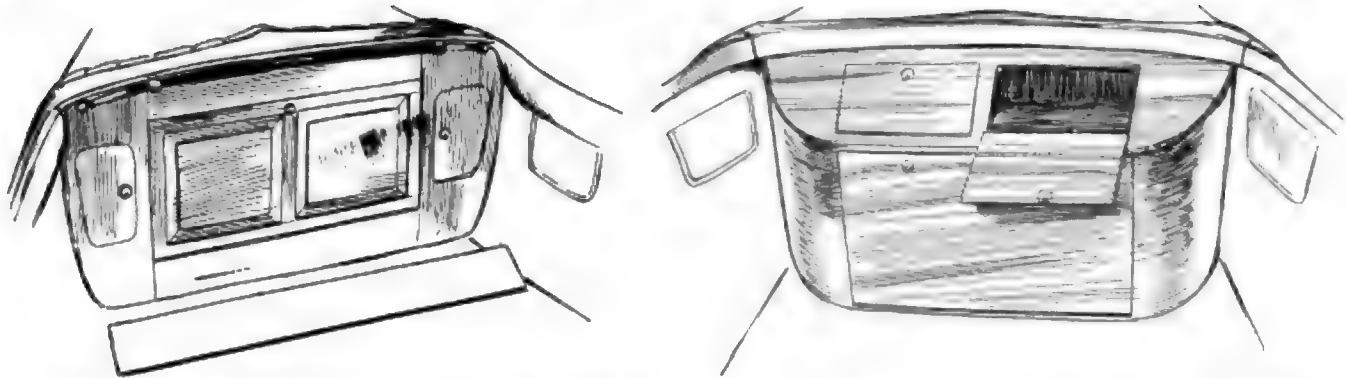
This shows the tonneau windshield of the Daniels. The glass drops down and side members fold down neatly covering the opening



This shows the novel way of treating the top rail in the Simplex. The narrow bead is aluminum



This shows the peculiar body of the Novara, which is built like a boat



The view at the left shows the compartment in the back of the front seat of the Mercer and the one at the right shows how small articles are stored in back of the National front seat

division two models at the show are attracting attention: One is the two-passenger Scripps-Booth with four-cylinder motor. This car is a comfortable job. The seats are deep and well fitted to the body. The doors are wide.

Two-Passenger Peerless

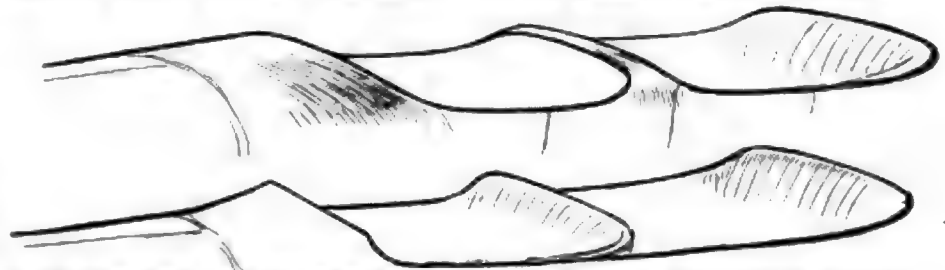
Another two-passenger job is a Peerless roadster in bright green. Its chief merit lies in the very large rear deck in which is carried the spare wire wheel. There is also additional baggage facility. It is the best attempt at inclosing the spare wheel in a runabout of the large type that has been seen at any show. Smaller makes have successfully handled this job in former years. The rear deck is very wide, giving perhaps a too broad appearance, but this may possibly be corrected.

Pathfinder deserves particular mention for the study it is putting in its runabout and touring car bodies. In the touring car it has made one of the best efforts of the year at housing spare tires within the body. To do this a tire carrier is placed under the body at the rear. It is true this gives a rather unusual appearance to this part of the car, but the effort should be commended. There is no more difficult job

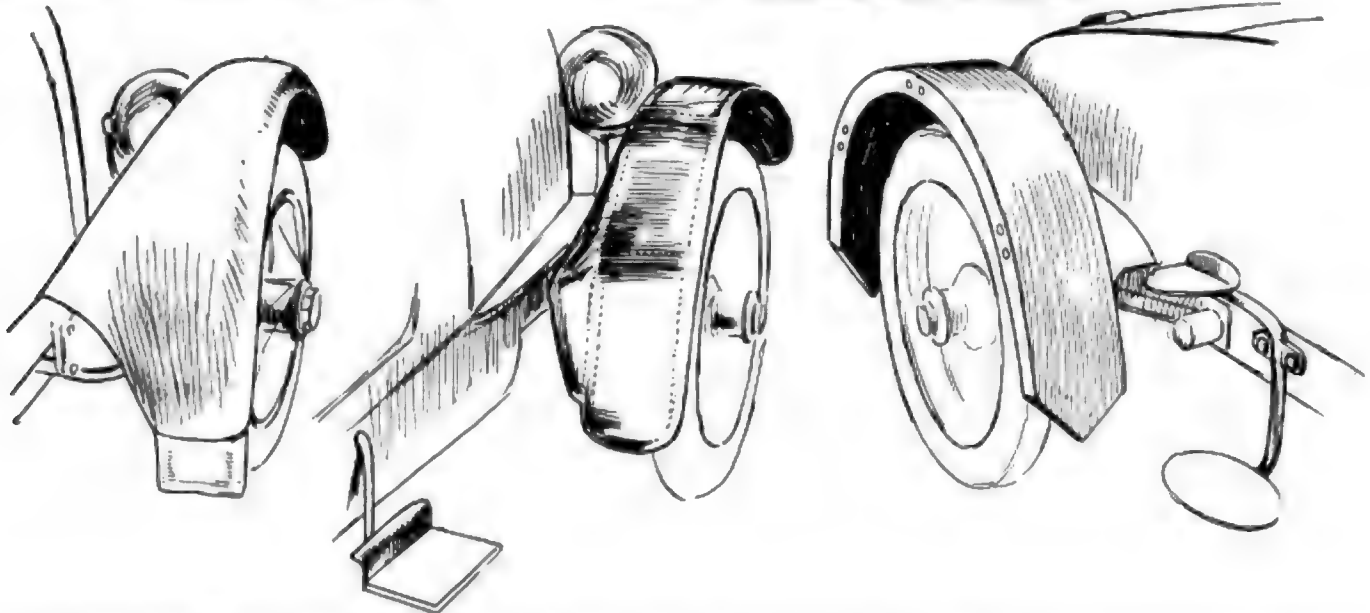
confronting body builders than that of inclosing tires. Reference to the body review at the Salon show in this issue will remind you that several custom body builders have almost given up hope of satisfactorily solving this job. In motor car design the unusual has generally come from outside sources and in this respect it may be that the mind unhampered by the tradition of body design may accomplish this new job. The Pathfinder runabout is the only example of the show of housing the top within the body. The company had this design a year ago and runabouts in use during the entire year are demonstrating that it is possible to keep the top dry and clean with such a

design and it cannot be doubted that it adds materially to the appearance.

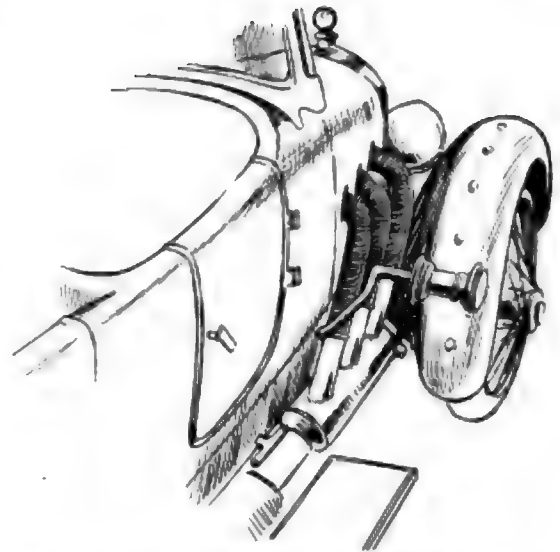
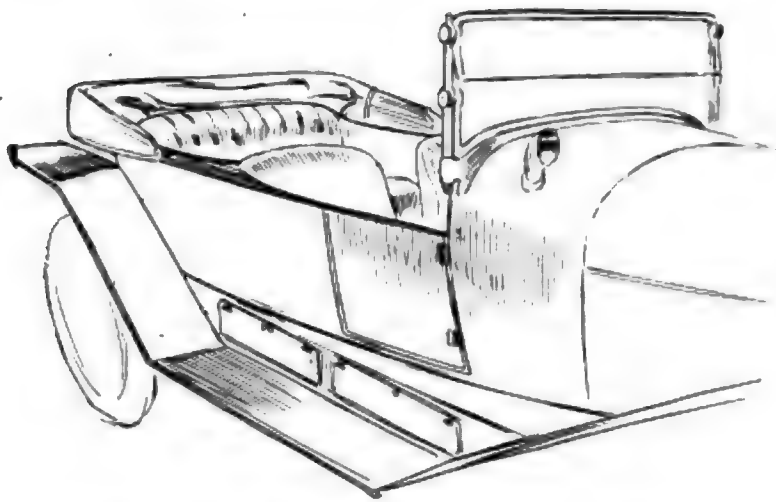
In the closed body types, Cole should be congratulated on its Springfield type which takes the form of a four-door touring job that can either be a sedan or a limousine. The partition back of the front seats made of two sliding glass panes can be removed accomplishing the transition from a four-door limousine to a sedan. There are many other details of merit in it. It is the only Springfield type at the show with four doors. The front door is particularly wide so that when opened the complete end of the seat is exposed. In the rear compartment are several small baggage spaces, in fact, there is no car



c—The upper sketch shows the tendency in the top line of bodies as contrasted with last year's prevailing line shown in the lower sketch. This year's type is quite appropriately termed the wave line



The running-boardless cars very much in evidence at the show. Here are some of the fender treatments. At the left is the Riddle, in the center the Daniels leather-covered fender, and at the right the Lancia



At the left is the very low Locomobile body showing also a tendency to treat rear fenders the same as those in front. At the right is a special Biddle job which is attracting much attention on account of its racing type exhaust

at the show so well taken care of in this respect. It is questionable if there is any other car that gives so much evidence of the designer having in mind the general convenience of those to ride in the car. The wide covered space back of the front seat will accommodate many articles essential in touring.

In the town-car field Marmon merits commendation for a Holbrook body which is the best in the show so far as excellence and perfection of workmanship are

concerned. The body is a typical town car design with particularly good lines and every detail of workmanship well looked into. The doors fit unusually well, in fact, many makers of stock bodies could study the workmanship of this one, not that there would be any thought of duplicating it but it does suggest improvements that could be incorporated in stock jobs with a very limited outlay.

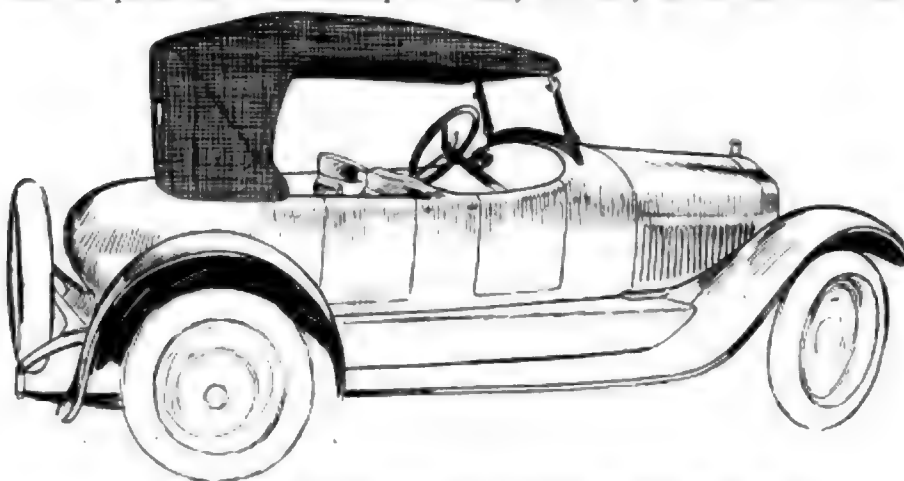
A review of the show job brings to light many new body models that have been

entered on the stock schedules of different factories. Deliveries of several of these will not be possible for weeks, and in some cases months.

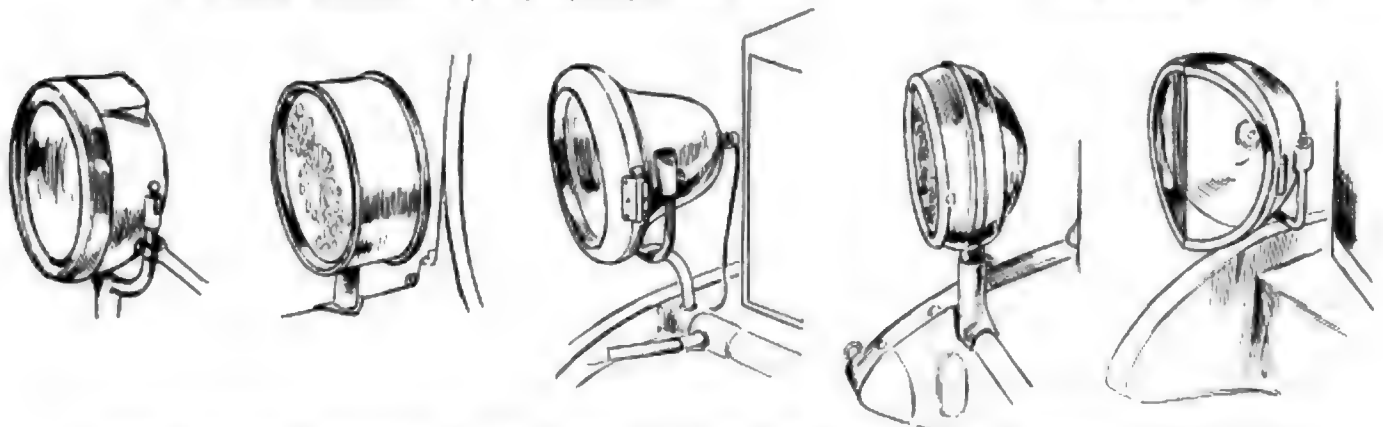
In this connection Saxon has a new \$1,250 sedan on which it is just starting delivery but hopes to ship sixty during January. It cannot be classed with the Springfield type but has a permanent top with completely removable sides. The two center pillars are removable and are carried under the seat. The upper glass drops into the door panel. Emergency side curtains for summer use are carried. There is a double windshield and the individual front seats tilt forward to permit wider entrance at the center doors.

Paige has a convertible roadster for four passengers which is one of the newest additions to its line. It has a folding rear seat, and back of the front seat is a very complete bank of compartments for all kinds of touring necessities, baggage, etc. The top is not a folding design but a canopy style supported front, rear and in the middle. When not in use the canopy cover folds and is put in the car. Deliveries will start in three weeks. The price is \$1,695.

King has its new touring sedan on which
(Concluded on page 25)

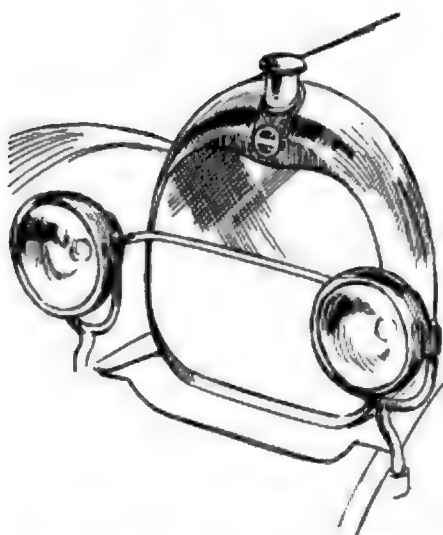


This shows the characteristics of the four-passenger White roadster



Some of the novelties in lamp designs. Reading from right to left they are: Locomobile, Phianna, Rolls-Royce, White and Biddle

Fifteen Debutantes Make Bow



The shape of the radiator of the Majestic is distinctly individual

NEW YORK, Jan. 6.—The motoring world looks to the annual exhibition at the Grand Central Palace for first view of new cars and expects that manufacturers who have developed new designs are keeping them in hiding in many cases to spring as a surprise at the show. This has been the case this year and there are fifteen cars at the show that never have been shown to the public before and of these seven have never been announced in any way. The majority of the new cars are assembled jobs, so that from the standpoint of engineering development few of them are important. There are one or two departures of which the most important on account of the standing of its maker is the Buick Big Six with its intake valves considerably larger than the exhaust valves. Another and important one is the new Paige trunnion drive. The Bateman front drive car and the Drexel 16- and 8-valve overhead motors are more interesting from a development standpoint than for any other reason.

The new cars are the Bateman, McFarlan Magnetic, Drexel, Oldsmobile six, Enger four, Columbia and Ben Hur, which are altogether new and have never been mentioned and the Scripps-Booth four, Buick big six, Overland ninety, Willys-Knight eight, Doble steam car, Majestic, Pullman and the Dey electric, which are exhibited for the first time.

New Oldsmobile Six

Oldsmobile kept its six for a show surprise and it is now on exhibition for the first time. It incorporates an L-head block 2 $\frac{1}{2}$ by 4 $\frac{1}{2}$ engine of the external-pushrod type with detachable cylinder head, but with a casing of aluminum covering the overhead rockers as well as the side mechanism of the valves acting as a silencer and also preserving the simple exterior and non-dust catching qualities

Class of '17 Shows Many New Developments of the Twelve-month

which are the aim of all the designers of the present.

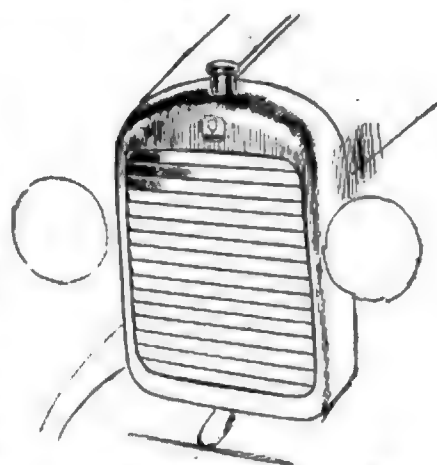
The unit is free from radical features of design, being practically conventional throughout, and in fact this same conventionality is carried throughout the entire car which is a substantial vehicle provided in either five-passenger touring or four-passenger roadster form at \$1,095. It is known as the model 46.

As far as the fittings and auxiliary attachments of the car are concerned, there is nothing unusual, the carburetor being a Johnson, ignition, starting and lighting by the Delco system, gasoline feed by Stewart vacuum, water circulation by pump. The drive is taken by a leather cone clutch which is housed, together with the engine and gearbox, as a unit powerplant. There are two universals, one at either end of the propeller shaft, both being Spicers and transmitting the propulsive torque to a full-floating spiral bevel rear axle, having a gear ratio of 4 $\frac{1}{2}$ to 1. The wheelbase is 112 in. and the tires are 32 by 4.

Some of the smaller features about the car show a great amount of attention paid to detail. The spark plugs are very accessible located in the side of the engine and are not concealed by this silencer cover which is put over the valve action. The mounting of the horn is substantial and yet free from objectional appearance, this being gained by mounting it behind the dash with the flange carrying the diaphragm acting as the supporting member connected the horn to the dash. The upholstery is the latest type of plaited leather over spiral springs and the leather is mounted over the top rail very neatly. Another little feature is in the material used to



A special Roamer job has individual windshields so that one passenger may get ventilation without affecting the other



The Columbia is fitted with a cold weather shutter for the radiator

cover the running boards and floor in the driver's compartment. This is a composition known as Linkrustum. There is a new shape of radiator conforming to the original lines carried out in the eight-cylinder Oldsmobile. On the spring bolts there are oil cups instead of grease cups in line with recently observed tendencies and the rear springs are semi-elliptic with the spring carried back to form what might virtually be a second member in the three-quarter elliptic shape, that is, the termination of the frame acts as the upper spring member. Both the steering wheel and the dash are Circassian walnut.

Columbia Six

The Columbia six, product of the Columbia Motors Co., Detroit, which has been under development for some time, was exhibited. This is an assembled unit with familiar parts throughout. The engine is a Continental six, being the popular 3 $\frac{1}{4}$ by 4 $\frac{1}{2}$ L-head block design used in a number of the assembled products this year. The clutch is a Borg & Beck with the Warner gearset, these three units being assembled as a unit powerplant. The drive is through Spicer universals to a floating Timken axle and the suspension is upon Detroit self-lubricating springs of cantilever design. The rear cantilever is 49 in. In equipment Ward-Leonard starting and lighting is used, Atwater Kent ignition, Stromberg carburetor and a Warner steering gear. The wheelbase is 115 in.

Ben Hur a New Car

Another new assembled car is the Ben Hur, made by the Ben-Hur Motor Co., Cleveland. This has a Buda engine, being the unit rated at 60 hp. with 3 $\frac{1}{2}$ in. bore and 5 $\frac{1}{2}$ stroke. It is a block L-head design, lubricated by combination splash and pressure, cooled by pump circulation with Bosch high tension magneto for ignition. The car has standard transmission parts with Timken axle. It has a wheelbase of 126 in. with

The New York Show Accessory Corner

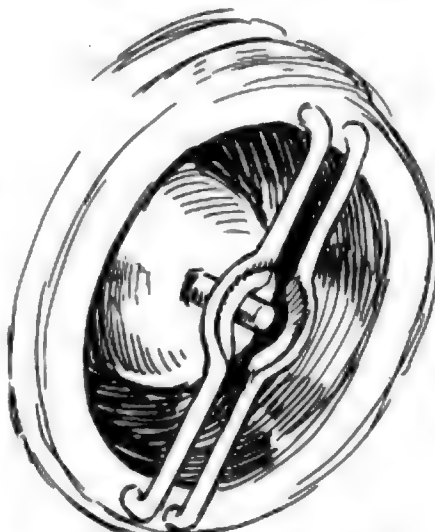
Improvements in All Lines Together with Some Noteworthy Additions Give Most Complete Parts List Ever Offered

New Things in Luggage Carriers, Spark Plugs, Ford Additions and a Tire, Gasoline, Oil Mileage Instrument

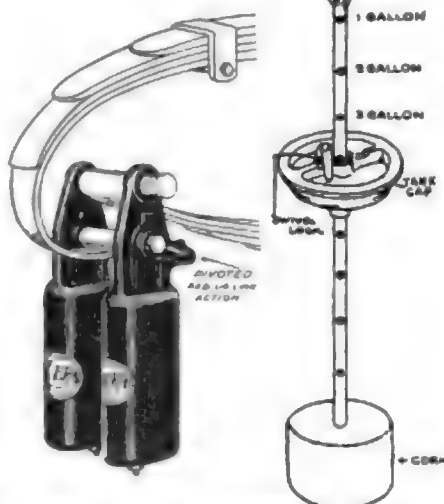
INTERESTING in the line of new accessories in the Grossman booth are the Red Head Vitristone spark plugs, which embody numerous types of Red Head constructions but with a new insulating material called Vitristone made in the company's own potteries. This new artificial stone insulator meets the requirements of the modern high-speed motor for insulating material which is capable of withstanding the severe conditions imposed by tremendous heat of combustion rapidly alternating with the intake of cool gases. Another feature of the line is the priming plug for facilitating starting. This sells for \$1.50. Standard plugs for Fords sell for 75 cents and other car types \$1, though platinum-point plugs are \$1.50 and the Big Boy type \$1.25. A number of new bumpers are shown as additions to the Ever Good line, consisting of channel and double spring bumpers for Packards and 1917 Dodge cars, similar types for Franklins and still others for Fords. Two new types of diminishing mirrors, one for fender mounting and the other having ball and socket adjustable joint and a new mini-fying beveled mirror, which reduces objects to their correct proportions and shows the relative distance between them, are also exhibited for the first time. Other new things at this booth are a combination rear tire carrier and license bracket for Fords and Chevrolet 4-90 and new models of the Ever Good windshield cleaner for shields having round, oval or square tubing. Emil Grossman Mfg. Corp., Brooklyn, N. Y.

Touring Luggage Carrier

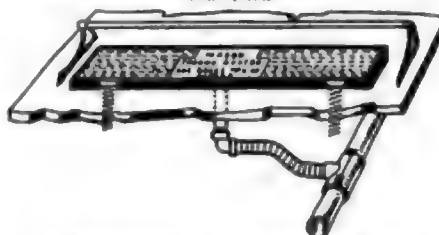
There are two new ideas in the Jay & Dee quick-detachable touring luggage carrier. The device is made up of two overlapping strips of metal that extend across the running board, the ends being connected by a strap which passes over the luggage, which fastens with a clamp which is screwed up by a thumb nut against the lower surface of the running board. There is a ratchet-tooth connection between the two strips of metal which permits of extending the width to accommodate unusually wide pieces of luggage, and the clamp bolt has a smooth head which does not necessitate boring holes in the running board nor damage it in any way. Price \$2.50 per set of two. The Aderente headlight deflector has been improved. The



A new type of Mosler plug, embodying a double-shoulder insulator and knife-edged electrodes—A. H. Mosler & Co.



The New Era twin-elliptic shock absorber with pivoted radius-link action. New Era Spring & Specialty Co., Inc., Detroit. Ever-Right gasoline gage for Fords—Universal Distributors, Ltd., New York.



Showing method of installation of the new Mason thermo heater—Cox Brass Mfg. Co., Albany, N. Y.

device now covers only the upper half of the headlight lens, thus eliminating the blinding rays, but retaining the full measure of light on the roadway. In the construction of the device, which consists of strips of metal running across the lens, each strip is bent at such an angle that the light rays from the upper half of the reflector are projected parallel with the ground instead of upward. The price is \$2 per set. Jay & Dee Specialty Co., Inc., New York.

New K-W Lock for Fords

In the new K-W lock for use on Fords the housing covers the entire switch face whereas in the old type the cover went on top of the switch and could be pried off. This device has been approved by the underwriters' laboratories which means a reduction in insurance fees for cars equipped with it. In addition to locking the switch, the autolock also locks the four coil units into their box. The price is \$3.50. K-W Ignition Co., Cleveland.

Gemco Specialties

A new tire holder especially for Chevrolet 4-90 cars combining rear lamp and license carrier is found in the Gemco booth. The device is made up of two substantial hooks and bolts directly to the frame requiring no drilling or mechanical changes. It weighs 21 lb. and sells for \$4 complete with straps. At this exhibit is also found the Gemco steam vaporizer for mounting on the exhaust manifold, the steam generated being injected into the intake manifold. This device has been described previously in MOTOR AGE. Ford size sells for \$11; other sizes, \$12. Gemco Mfg. Co., Milwaukee.

New Superior Products

New things in the Superior line comprise a radiator shell for 1917 Fords, wire wheels for Ford cars with demountable rims and numerous other products are new in the Superior offerings. The radiator shell has an apron attached covering the Ford front axle, the shell having a V tapering top, designed to give an elegant effect when slipped over the radiator. The regular hood is retained. Price, in black finish, \$8; nickel finish, \$10.50. The wire wheels with demountable rims are furnished complete with ball cups, dust cups, wrench, nuts, etc., the right front hub being arranged for a speedometer gear and

the rear hubs with brake drums, etc. The use of demountable rims obviates the possibility of spokes working through the rims and pinching the inner tubes. A set of four wheels complete with rims weighs 130 lb. There is one extra demountable rim included in the price of \$40. The wheels are finished in black baked Japan with nickel-plated caps. The Superior company is also showing a large line of various types of custom made brass and nickel lamps for special body work in addition to its regular line of motor car lamps. The line also includes special products for Ford cars, such as radiators, streamline hoods, windshields, crowned fenders, running boards, etc. Superior Lamp Mfg. Co., New York.

Aitchandee Shock Absorber

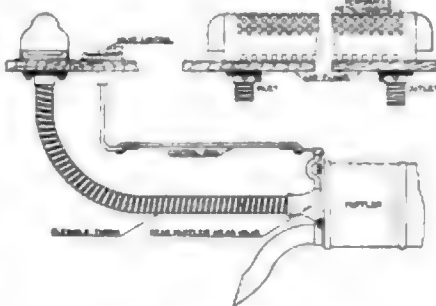
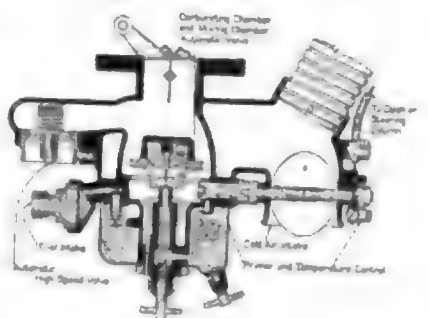
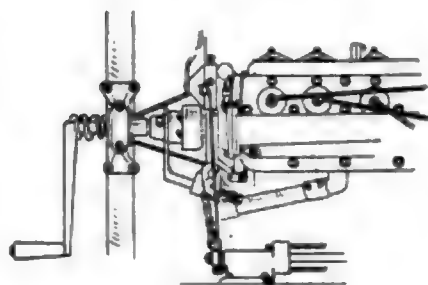
A new type of Aitchandee shock absorber appears at the show. It adheres to the standard Aitchandee principle of construction embodying leverage arm and spring, except that each unit of the new type comprises two arms and springs, the new model being known as the Twin Aitchandee. It sells for \$12 per set of four as compared with \$10 per set of the single type. The Aitchandee safety spark retarder for Fords is a small attachment to the spark-control rod extending from the bottom of the Ford steering column to the timer. The device automatically retards the spark when the crank is pushed in and can be set to bring the spark lever to any notch. It is easy to attach having only one pin and one bolt to change. The price is \$3.50. H. & D. Co., Inc., Goodland, Ind.

Shakespeare Carburetor Improved

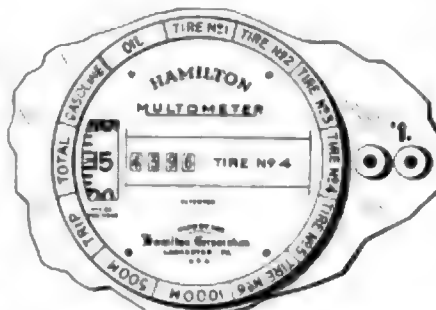
The Shakespeare Co. has brought out carburetor controls to meet the S. A. E. standard $1\frac{1}{4}$ in. throw. These are for both dash and steering-wheel mounting. An improvement has also been made in the Shakespeare automatic carburetor. It now incorporates a patented primer consisting of a tube leading from the mixing chamber to a point above the throttle so that the primer functions separately, delivering a gargled mixture of fuel and air directly into the manifold, which greatly facilitates starting, especially in cold weather. Shakespeare Co., Kalamazoo, Mich.

Wagner-Hoyt Instruments

The Wagner-Hoyt company exhibits motors, generators, battery and magneto ignition units and the appurtenances. These are all Ward-Leonard instruments weighing respectively 10, 15, 24 and 18 lb. and having capacities of 8 amperes for the 10 lb. instrument and 10 amperes for the others. The Ward-Leonard system of control is used with each. Two types of starting motors are manufactured. The W-H battery ignition set consists of an interrupter, spark coil and condenser, distributor and switch. A feature of the breaker mech-



Safety spark retarder for Fords—The H. & D. Co., Goodland, Ind. New primer and controls in Shakespeare carburetor—Shakespeare Co., Kalamazoo, Mich. Type DP heater for Cadillacs and Packards—The Perfection Spring Service Co., Cleveland, Ohio



Gasoline, oil and tire consumption recorder and speed indicator—Hamilton Corp., Lancaster, Pa.



Showing one position of Green safety signal—General Safety Signal Co., Newark, N. J.

anism which is a simple cam-operated type, is that it is lubricated by a felt roller which keeps the internal friction at a minimum. The magnetos are made in two styles, the W-H and the Volta. The W-H is a two-spark-per-revolution type of high tension instrument with the distributor self-contained. The Volta is a distinctive type with waterproof qualities. The condenser is mounted in a sealed box on top of the pole pieces, the armature is dust and waterproof. The high-tension collector ring is directly under the distributor giving a short, direct, waterproof connection. Wagner-Hoyt Electric Co., New York.

Special Perfection Heaters

Special models for Cadillac eights and Packard twin sixes are now available in Perfection heaters. They differ from the standard heater in that there is an inlet at each end to take care of the exhaust gas from each pipe and an outlet in the center. Heating tubes are protected by a perforated metal guard designed for strength without interfering with air circulation. The Cadillac type with oxidized brass housing ready to install sells for \$32.50. For a floor type heater the standard type A can be connected to each exhaust pipe, this outfit costing \$31. In the Cadillac Victoria the type A is satisfactory when connected to the right hand exhaust pipe only. Price \$25. Perfection Spring Service Co. Cleveland.

Hand Direction Signal

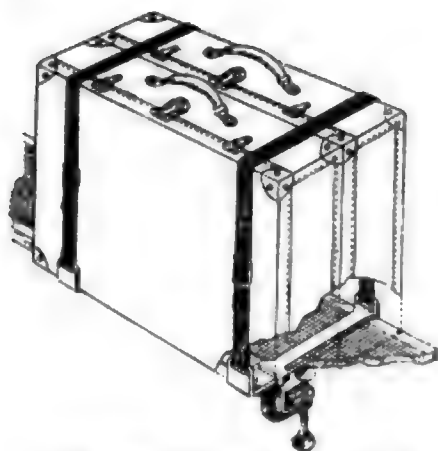
The Green Hand safety direction signal illuminating front and rear simultaneously is a new one this year. The hands are green and can be seen lighted at noon-day 100 ft. away. The tail light is combined in the rear signal box. While the signal was primarily designed for night work, its value as a day signal has been demonstrated. Throwing the lever to the right, front and rear hands light up pointing to the right indicating a turn in that direction; to the left on the switch illuminates front and rear hands pointing to the left; throwing the lever back illuminates both. General Safety Signal Co., New York. It is exhibited by Oach & Co., Inc.

Mason Thermo Heater

The Mason instrument is an exhaust heater which rests on the tonneau floor and not in it. The heat is controlled by a thermostat. The dimension are 27 by 4 by $\frac{1}{4}$ in. There is $\frac{1}{4}$ in. clearance between the floor and the heater. It is a simple matter to install this heater as it is merely necessary to cut a V-shaped hole in the muffler with a hacksaw and bore three holes in the floor of the car. Prices are \$10 and \$15. Cox Brass Mfg. Co., Albany, N. Y.

New Type of Mosler Plug

The real feature of the Mosler double hub plug is that the insulator has a double hub or shoulder on it so that the nut



Quick-detachable touring luggage carrier
—Jay & Dee Specialty Co., New York

which holds the insulator in place bears on the upper shoulder. The pressure between this point and the lower shoulder is more evenly distributed and there is less danger of breaking. The spark jumps from the central electrode to two knife edges, one on each side, which are said to remain so hot that it is impossible for carbon to collect on them and consequently, the gap cannot be short-circuited. At the same time there is no danger of burning the metal because it is made from a special nickel manganese alloy. The price is \$1 and it is guaranteed to outlast the motor. A. B. Mosler & Co., Mt. Vernon, N. Y.

Emblems on Moto-Meters

A large selection of emblems is offered at no extra charge to purchasers of the largest Boyce Moto-Meter. These emblems include car name plates, club insignia, fraternal emblems and initial dials. Because of the great variety of these emblems it is impossible for a dealer to stock a full line and consequently, the factory is supplying these direct at no extra charge. The only change in the line is the addition of a special Overland design in which the stem of the Moto-Meter is designed to screw into the Overland radiator cap in place of the screw which comes with the car. This design may be had in all three Moto-Meter models. The Moto-Meter Co., Long Island City, N. Y.

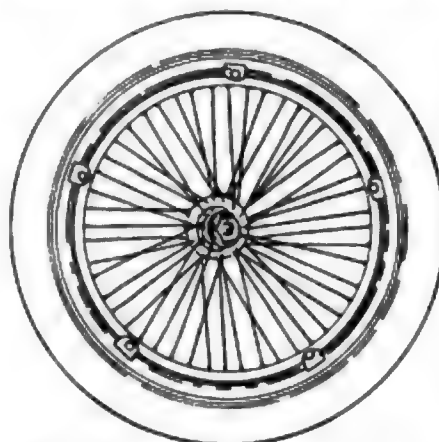
A-B-C Starters for Fords

The A-B-C electrical systems for Fords have been changed to make installation simpler and maintenance easier. The generator is now driven by a three-way V belt that also drives the fan and a stamped bracket is now used for attaching the device to the engine. Installation is very simple and requires no changes in the Ford construction, merely the substitution of longer bolts for the short bolts of the Ford engine. The price of the system includes the installation and is \$95 complete with starting motor, generator, gear-case assembly, Ward-Leonard controller, battery and battery box, starting switch,

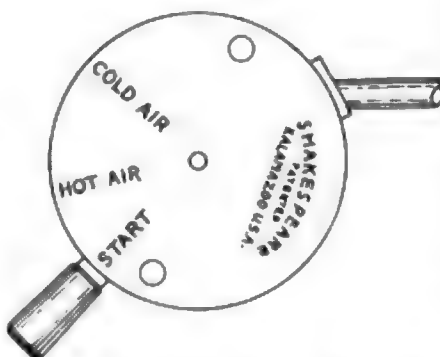
ammeter, lighting and dimming switch and all necessary wiring. A-B-C Starter Co., Detroit, Mich.

Hassler Shock Absorber

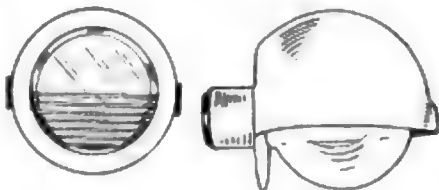
The Hassler shock absorber is designed for application to Ford cars. It consists of a spiral conical spring of chrome-vanadium steel attached to the end of the spring leaf and to the axle through a flexible lever device, one on each spring end. The shock in passing through the car must pass through a lever that is hinged to the spring and compress the conical spring before the standard leaf spring of



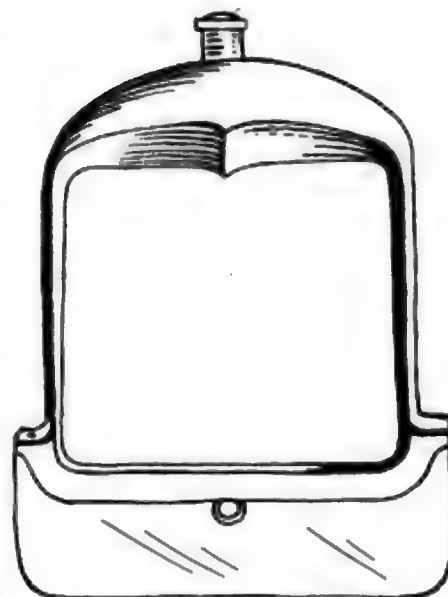
Superior demountable wire wheels for use on Fords—Superior Lamp Mfg. Co., New York



New steering-column control assembly
—Shakespeare Co., Kalamazoo, Mich.



Above, left, Adherent headlight deflector—Jay & Dee Specialty Co., Inc., New York. Above, right, Amca headlight deflector—Heinze Electric Co., Lowell, Mass. Below, Marvel chain fastener and tire tool—Automobile Accessories Co., Pittsburgh, Pa.



Clip-On radiator casing for 1917 Fords
—Superior Lamp Mfg. Co., New York

the car comes into action. In the rebound the spring again comes into action also tending to lessen the shock. Robt. H. Hassler, Inc., Indianapolis, Ind.

Tire Carrier with Lock

In addition to being a tire carrier of exceptionally rigid construction the Hoover device also permits the tires to be positively locked in place, thus preventing theft. On a sturdy rack bolted to the rear of the car is a circular frame over which the tires are placed. An expansion clamp is then opened forcing two spring arms behind the rim of the tire and holding it securely in place. The expansion clamp is then locked in position by means of a padlock. Several advantages are claimed for this carrier, namely that the tires are kept apart, are kept in place without either chains, straps or pans and hence there is nothing to chafe or ruin the tire. The standard size has capacity for two tires, but it is also made of one or three tire capacity. Hoover Spring Co., Inc., San Francisco, Cal.

Compact Folding Seats

McKinnon seats permit carrying of more passengers. One type, the \$90 for the Ford, is made to fasten onto the rear doors, the bottom resting on the sill which takes the burden of the weight. By the use of two of these seats seven passengers may be carried in the touring car; the doors cannot be opened when the seats are in use. This type of seat can also be made to fit the Overland. In construction the seats are made of round steel electrically welded and handsomely japanned, with black art leather padded upholstery. When not in use these seats fold into a space 12 by 19 by 3½ in. and have a net weight of four pounds. The price is

(Concluded on page 47)

Parks-Motoring Kinship Emphasized

National Conference Stresses Importance of Touring in Relation to Country's Scenic Assets

WASHINGTON, D. C., Jan. 5.—The close relationship between the development of the National Parks and motoring has been emphasized strongly during the meeting of the National Parks Conference here. To-day was given to a consideration of motor travel to the parks. Touring and its relation to road building and the exceptional scenic assets of the United States composed the main theme of the day, particular attention being paid to touring in its relation to the National Parks.

A. W. Seaman of the Long Island Automobile Club told how to equip for trans-continental touring. Orville Wright naturally spoke in favor of air routes to the parks. George C. Diehl, chairman A. A. A. good roads board, told of the improvements made in the country's highways. He showed how system in the construction of highways to and through the parks would be necessary if the full benefit of the parks is to be obtained by the public. C. F. Bishop, who has made many long trips abroad, compared Europe's commercialization of scenic and health assets and our lack of commercialization, urging that we advertise the advantages and beauties of our country, the parks in particular.

E. L. Ferguson, manager of the A. A. A. touring bureau, reviewed the routes of travel in the United States. He spoke on the capitalization of scenery, history and good roads in view of the wonderful increase in touring. Among other things, Mr. Ferguson said that from east of Portland, Me., and from Quebec, Canada, less than 100 miles of uncompleted connecting highway exists. Florida is capitalizing her winter balm, her royal palm and her orange groves in prospect of further increase in motor travel as the highways are extended. A few years ago it was difficult to find even one way across the country, but now seven routes invite the traveler. Many of these long-distance inter-connecting routes bear various historical and geographical names, and some are marked with the name of some man famed in the country's history. These roads branch in all directions, and the branches are practically numberless.

George Holms of the Park-to-Park Highway Association dwelt on the possibilities of a park-to-park highway system, the series of parks to be connected by a series of highways. Such a plan, Mr. Holms said, would add greatly to the pleasures and comfort as well as the enlightenment of motoring tourists. Mr. Holms also paid

tribute to Assistant Secretary Mather for much of the impetus given the park-to-park movement.

AJAX-RACINE PURCHASE CONFIRMED

Racine, Wis., Jan. 8.—Following the confirmation by stockholders of both corporations of the purchase by the Ajax Rubber Co., Newark, N. J., of the Racine Rubber Co., Racine, Wis., the Wisconsin corporation has filed amendments to its articles which provide that the preferred stock may be called in and cancelled upon payment to the holders of 105 per cent of the face value, together with all unpaid accumulated dividends up to the date of such call for cancellation, the dividends to be paid out of the profits. The actual transfer of the ownership is accomplished by an exchange of securities at the rate of 570 shares of Ajax common for 100 shares of Racine Rubber common. Racine Rubber preferred is retired at 105 and accrued dividends. In addition, holders of two shares of Racine common will have the right to subscribe to one share of Ajax common at \$6,625.

NEW WIRE WHEEL COMPANY

Albany, N. Y., Jan. 6.—The Wire Wheel Corp. of America, New York, has been granted a charter to manufacture wire wheels for motor cars and aeroplanes. It will do business with \$3,000,000. Its shares of capital are \$125,000, four-fifths of which is of no par value.

RECEIVERS FOR PULLMAN

York, Pa., Jan. 5.—A temporary receivership has been appointed for the Pullman Motor Car Co., and the affairs of the concern are now being looked after by W. A. Keyworth, Henry D. Schmidt and Carlton L. Hoff. Officials of the company claim that the receivership was made necessary because of the heavy purchase of raw material in anticipation of future requirements. In the decree of the court appointing the three receivers a complete inventory was ordered, which is now being taken. It is purposed to resume operations in full next Thursday.

The bill of complaint filed by the plaintiffs, John C. Schmidt, George Schmidt and Carlton L. Hoff, sets forth, among other things, that the capital stock of the company is \$500,000; that in 1916 it did a business of \$3,343,000; that the amount of indebtedness is \$557,163.54, and the assets \$989,357.95; that the company is solvent and has assets largely in excess of its liabilities.

The object sought by the receivership

proceedings, officials of the Pullman company claim, is the rehabilitation and further development of the plant. The company now has contracts for more than 10,000 cars of the 1917 model, it is announced.

TO BUILD ANOTHER U. S. GARAGE

Brownsville, Tex., Jan. 5.—In addition to the two large motor truck garages and repair shops which are to be built by the government for army use at Fort Bliss and Fort Sam Houston, announcement is made of the adoption of plans for the erection of a similar structure here. The quartermasters' department at Fort Sam Houston has leased two blocks of ground here which will be the site for the proposed buildings.

APPROVE SPRANGER INCREASE

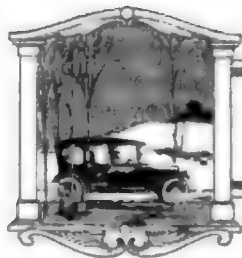
Detroit, Jan. 9.—The majority of the stockholders of the Spranger Rim & Wheel Co. have approved the increase in capital stock from \$100,000 to \$300,000, all common stock. The name of the company will be changed to the Spranger Wire Wheel Co. and a new factory is to be erected which will provide a capacity of 500 sets per day.

N. A. C. C. BANQUET HELD

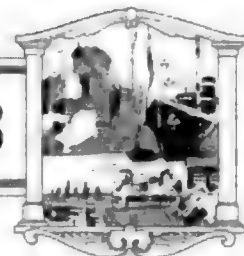
New York, Jan. 10.—Motor car manufacturers dined to-night at Hotel Waldorf at annual banquet of the National Automobile Chamber of Commerce. President Clifton was toastmaster. Job Hedges spoke on the humanities business. A farce on recent legal aspects in the industry acted by New York journalists closed the meeting.

PATHFINDER AND EMPIRE MERGE

Indianapolis, Ind., Jan. 9.—The Pathfinder and Empire motor car companies have been merged into a \$5,000,000 corporation with added capital which will permit a greatly increased production. The respective names of the cars will be retained, and it is probable that the Pathfinder organization will have a paramount part in the new company. The entire plan is not perfected in all its details. The financing is being handled by Boughton & Co., 120 Broadway, New York, bankers. It is understood that considerable Indianapolis capital is back of the consolidation. The Pathfinder Co. last year built 1000 cars and under the new plan will turn out 2000. The output of the Empire Automobile Co. also will be increased. The Pathfinder Co. was originally the Motor Car Mfg. Co., but reorganized several years ago and increased its capital to \$250,000, where it stood before the merger.



EDITORIAL PERSPECTIVES



The Sixteen-Valve Motor

EACH New York show for many years has had its particular spot-light, and this season the sixteen-valve motor occupies this role. It is true there are only two manufacturers exhibiting the sixteen-valve design at the show, but to this must be added the one large maker exhibiting it at the Salon. Of this total of three two represent firms that have been strong exponents of four-cylinder design as opposed to sixes, eights, and twelves. It is natural that Stutz having built the greatest reputation of any U. S. A. maker in speedway racing, and having accomplished this with sixteen-valve designs, would eventually incorporate it into a stock motor. If it has been possible to obtain great speed with four-valve construction in racing, it is possible to obtain it in stock cars with the same construction. On the other hand, White has not been an exponent of racing but has pioneered in the adoption of many stock-car features. It was a leader in the adoption of the long-stroke block motor. It was a leader in adopting the center cowl for stock body construction.

IT IS because of the unique position which both firms have occupied that more than usual attention attaches to their bringing out stock sixteen-valve four-cylinder designs. The

step is not one hurriedly taken but one that has been under development for several years by both. This carries conviction in weighing the possibilities of the future of such a design. The wider adoption of the sixteen-valve job will not be such a landslide as for six-cylinder motors or even eights or twelves for the reason that demand for a satisfactory car with any number of cylinders is much greater today than in the days when sixes were coming to the front and when eights and twelves were put on the market. It will always be expected that a certain number of firms will attempt to be rapid imitators in the sixteen-valve field, but this movement of imitation will not be so heavy in the next few months as it was after the announcement of the eight-cylinder motor. It will be very surprising if there is such a stampede as the eight provoked.

THE performance of the sixteen-valve four in the hands of owners will be closely watched during the next year. The sixteen-valve four is being accepted as a challenge to the six, eight and the twelve. The public is viewing it in that relationship to-day, and the adoption of it will largely depend on how it performs in this particular field, which should be fairly well determined within the next six months.

The New York Show

WITH 1,525,578 motor cars built during the calendar year 1916, as compared with 892,000 during the calendar year of 1915, it is not surprising that at the present Grand Central Palace Show there should not be that innovation in chassis-design, etc., which was seen a year ago. The year 1916 must go down as a production year, rather than one of engineering development. You cannot expect a concern behind in orders and confronted with myriad difficulties in buying materials to introduce new models or make basic changes in the old. The task of the last year to produce sufficient quantities of regular models has been an impossible one.

THIS year's Grand Central Palace Show has not so many engineering features, so to speak, in the exhibit category as a year ago. A year ago there were several chassis that were eagerly waited for. This year two of the largest concerns have new chassis, but they are not so revolutionary or surrounded with so much interest as were the chassis of a year ago. The exhibiting of a Doble steam car this year has been a great interest creator, and the undertone of thought with regard to the

possibility of using steam is well evidenced by the constant crowds around this chassis. Steam has been a dead issue at New York shows for many years, and the revival of interest that this chassis indicates suggests that many have been thinking more on steam in these days when flexibility and performance are so much talked about than we would have believed before the show.

THIS year's show marks nothing short of a revolution in cleaning up the accessory exhibits. There are scores of up-to-the-minute accessory exhibits instead of the eye-sores of a year ago when the majority of the exhibits were slithered over long tables covered with dirty burlap. This year you meet with highly polished tables with glass tops on which accessories are displayed. There are many well-finished cabinets in which the accessories look attractive enough to make you want to buy them. This re-construction, or new life in accessory exhibits, started a year ago when the wedge was entered. At that time half a dozen concerns set a new pace and now there are groups of them.

Palace Show Bodies

THE palace show represents the great movement in body styles, and while it is not so brilliant in versatility of design as the Salon, it represents a broader current of thought. In this respect two dominant designs have been followed in the last year: The first is the literal landslide toward the small four-passenger job which is a development of the clover-leaf of a year ago. The second is the almost general practice of dividing front seats and leaving an aisle between them.

IT is questionable if either of these designs will become a permanent factor in the body industry; rather, they may both be classed as movements that will take a permanent place,

but not a dominating one. If the small four-passenger roadster is intended solely as an emergency type, then it will remain permanently but if it is intended to serve as a four-passenger touring car it will very probably fail. These four-passenger jobs are not four-passenger touring cars. There is not sufficient comfort in the rear seats to warrant taking a week's tour with four passengers. These vehicles have practically no space for baggage. As two-passenger jobs they are very satisfactory. They are good for three, and also good for four people in round-town work; but they cannot possibly take the place of a four-passenger touring job. There is a bigger field than ever for a good four-passenger car, one designed for this

particular field. Such a car can have accommodations for two or three suit cases in the tonneau without interfering with the passenger capacity. In these days of the utility motor car it is as essential to have space for baggage as for passengers.

THE question of the divided front seat in touring cars is a much mooted one, and the general adoption of it is due to the fact that it has not added materially to the cost

and has been a good selling argument. Individual front seats are not so comfortable as the undivided seats. They call for the use of separate robes in winter time. The separating aisle is a convenience but not used nearly so much as many salesmen would like to convince you it is. There will always be some of this type but it is more than possible that a year hence may show more using the undivided front seat than in the case with 1917 cars.

Body Design at Sixes

BODY designers who confine their entire efforts to high-priced custom body work in New York City, as well as in several other cities, are hesitating at present. They are wondering in what direction to go to bring out new body design. The streamline idea was developed to almost completion a year ago. It has now been literally absorbed body and soul by nearly all manufacturers of stock cars. The streamline idea is to-day the product of every factory; consequently, designers of custom bodies must look for some exclusive features not incorporated in the rank and file of stock-car products.

IT IS at this juncture the present hesitation is taking place. The body designers admit that they do not know which way to turn. They are trying variations, groping for something that will add that atmosphere of exclusiveness which high-priced makers so diligently seek after.

THIS situation explains why the many cars displayed at the thirteenth motor car salon, running in New York City for a week, present more variety in body design than seen in former years. After the constant movement towards streamline conceptions extending over the last three or four years the show visitor is at sixes and sevens when confronted with

the medley of body styles at the show. In one exhibit space are departures from streamline tendencies; in another, the streamline idea seems to have been burlesqued to give an aeroplane or submarine type of runabout; in another exhibit booth radical departures such as leaving off running boards or using leather fenders are noted; and in other spaces are radical body designs with heavily-paneled sides which are diametrically opposed to streamline ideas as understood up to the present.

THESE new designs must not be interpreted as suggesting new trends of body design; some of them may give such indications, but in general they represent the efforts of body designers to get somewhere out of the beaten channel and to give something more exclusive for those who desire a custom body job.

ALTHOUGH the salon has ultra-fashionable bodies, each year sees features from these fashion plates incorporated into stock car designs. The center cowl two years ago was a fashion talking point, but to-day it is a feature of stock cars. So it may be two years hence with many of the ideas in these fashionable car designs of to-day.

Californians in Mix-Up Many Dealers May Be Forced Out of Business by Reason of License Law

LOS ANGELES, Cal., Jan. 5—There are strenuous experiences in store for the hundreds of motor car owners and dealers in this state who failed to comply with the laws governing registration in 1916. Already, almost 1000 violations on the part of owners and some 200 charged against dealers have been detected. Unless some adjustment is made possible, dozens of dealers may be forced out of business.

Motorists, who acquired machines by transfer, or otherwise, last year and did not take the trouble to apply for a license and accompany the application with the proper fee now find themselves members of the constantly-growing in-bad class. Hundreds of cases developed through the original owner of a car, upon selling it, permitting the license plate to remain on the car. The purchaser continued to operate under this license without having the proper transfer made out and paying the required fee.

When buyers of cars of a low horsepower rating traded in a used car of a rating sufficiently high to make it ad-

visable for him to release his old plate and buy a new one for the smaller car, he thought he was putting through a shrewd deal with the state. Now, however, he finds he is charged for the old car's power and when he tries to explain he no longer owns the car, but one of less horsepower, he is assessed a penalty for his tactics of evasion that made him think he was clever several months ago. Under the law, the same plates used last year may be retained for 1917, but there must be a new license tag nevertheless. The license fee is 40 cents per horsepower.

With gross receipts for the 1917 business in the state vehicle department already amounting to more than \$1,000,000, there have been revealed more than 1000 violations of the law. More than \$3,000 already has been collected on delinquencies and this figure probably will reach \$10,000. The dealers are required to report all sales of motor vehicles to the state office, but many thought this was a bit of needless regulation and refused, or neglected, to do so. Now they find the state is refusing to license them as dealers and more than 200 have been notified a settlement must be forthcoming if they do business this year. Some of the largest concerns in the state have been notified of their failure to make proper settlement for licenses, and 'strict accountability' is going to be a watchword in this state, hereafter.

Barney Oldfield a Maker? Announces Intention to Manu- facture Cars, Light Trucks and Farm Tractors

LOS ANGELES, Cal., Jan. 5 — When Barney Oldfield left here yesterday for the East, the announcement was made that he intends to enter into the manufacture of motor vehicles and has a \$10,000,000 syndicate providing him with the necessary capital. The claim is made that the syndicate is composed of Los Angeles and New York capitalists and the organization will be known as the Oldfield Motors Corp. Racing motors, passenger cars, light trucks and tractors are to be built.

According to the announcement, the plans include the erection or purchase of a large manufacturing plant in Detroit, Mich. A service and assembly plant is to be conducted in Los Angeles. The details are said to have been revealed as the culmination of six months of negotiations. Arthur Fisk, former postmaster of San Francisco, a politician and until recently director of the Lucky Baldwin estate, James J. Jeffries and W. L. Wilson are named as Oldfield's local associates.

It is the intention of the veteran to make the coming season his final one in the racing game, he says.

Local Traffic Ordinances Denied

Judge Rules State Provisions Supersede Municipal Regulations in Suit

LOS ANGELES, Cal., Jan. 6—What is said to be the most far-reaching judicial decision rendered in California in relation to motor vehicle laws and the traffic question was handed down here by Superior Judge Finlayson, when he refused to permit local traffic ordinances to be introduced in evidence in a suit involving a motor car accident.

The judge recited as his opinion that it was the intention of the state legislature that the state vehicle law should regulate traffic on all public highways and that the use of the streets is not a municipal affair. This conforms to the previous ruling of the district court of appeal that cities, not under free holders' charters, have no power to pass ordinances regulating traffic. In municipalities governed by charters, said the court, the only ground on which traffic ordinances could be passed by city councils is that the regulation of traffic is purely a municipal affair.

While the supreme court has held that the opening or paving of a street, being a local improvement, is a municipal affair, Judge Finlayson declared that the highways are open to the free use of all citizens of the state as well as of the municipality; that a citizen of another city has equal rights on the streets of Los Angeles with those of this city and that therefore, the city charter is not paramount to the state laws and that the state laws, not city ordinances, shall prevail and be enforced by the municipalities through their police power.

Motor Age Influence

Such a ruling will probably result in the agitation for uniform traffic laws, undertaken by MOTOR AGE, having a strong influence in California. Whether the Eno system, which is similar to the one prevailing here is adopted throughout the state or not, some uniformity is bound to come out of the confusion. All cities and towns will have to be governed by the same general laws, so that the stranger, when once he has become acquainted with the provisions in any place can safely continue his journey elsewhere. El Monte cannot have a ten-mile speed limit, Ontario, twelve, Azusa, fifteen and so on with variations innumerable, but all must conform to the state regulation.

Judge Finlayson also made other very important rulings as to the law in this state relative to the liability of a car driver and pedestrian. He is:

If the windshield of a motor car obstructs the view of the driver by reason of drops of rain collecting on it, or, if the driver is blinded by a light from

ahead or reflected from his own windshield, it is his duty to stop at street crossings.

"BORROWERS" ARE WARNED

St. Paul, Minn., Jan. 6—The first bill introduced into the house of the Minnesota legislature this year was a measure amending the general laws of 1913 and providing severe punishment for motor car "borrowers." Any person who "takes, removes or operates any motor car from the place where left by owner or person in charge

Price Increases

DETROIT, Jan. 9—Prices of the Maxwell truck have been changed so that the chassis sells for \$795 instead of \$775, and the body styles are additional as follows: Box body, \$55; express body, \$95; panel body, \$105.

PRICE OF MAJESTIC IS \$1,650

New York, Jan. 8—The price of the Majestic car produced by the Majestic Motor Co., 1790 Broadway, is \$1,650, the new list having been established too late to be included in the issue of Motor Age for Jan. 4.

HAYNES RAISES CAR PRICES

Kokomo, Ind., Jan. 6—The Haynes Automobile Co., this city, has increased the prices on all four of its models for 1917, effective Feb. 1. Model 36, the six on the 121-in. chassis, and model 40, the twelve on the same chassis, have been increased \$110, and model 37, the six on the 127-in. chassis, and model 41, the twelve on the same chassis, are now \$140 higher.

INTERSTATE INCREASES PRICE

Muncie, Ind., Jan. 9—The Interstate Motor Co. increased the prices of its product Jan. 1 as follows: Five-passenger touring, \$75, to \$925; Standard roadster, \$25, to \$875; Chummy roadster, \$55, to \$950; divided seat touring car, \$45, to \$950. The delivery car price of \$850 is unchanged. The company also has a touring sedan at \$1,325.

HARVEY TRUCK PRICES UP

Harvey, Ill., Jan. 9—The Harvey Motor Truck Co., formerly known as the Harvey Motor Truck Works, has been incorporated for \$300,000 and announces new prices for its product as follows: 2½-ton, \$2,500; 3½-ton, \$3,250; 5-ton, \$4,000. The 2½-ton chassis takes the place of the former 2-ton truck. Officers of the company are William E. Dee, president; Simon R. Dee, vice president and treasurer, Bert B. Fornaciari, secretary and general manager.

shall be deemed guilty of a felony and upon conviction shall be sentenced to the state prison or county jail for a term not exceeding three years, or be fined \$2,000, or both." The bill is the outcome of a custom of defense that there is intention of returning the machine, and of no actual theft.

REMY IGNITION ON AUBURN 6-39

Auburn, Ind., Jan. 9—The Auburn 6-39 is equipped with Remy ignition instead of Deleo, as mentioned in the December 28 issue of MOTOR AGE in the table of electrical equipment on 1917 cars.

PERFECTION HEATER FOR FORDS

Cleveland, Ohio, Jan. 6—The Perfection heater model designed for Fords has been reduced from \$15 to \$10 owing to the great increase in the volume of production. The company plans to make \$25,000 during the year.

BIG TRUCK-FORMING DEAL

Chicago, Jan. 9—Within a few days announcement of the consummation of a deal between the Redden Motor Truck Co. and some large industrial corporation whose name is withheld at this time will be made, whereby the Redden company will be refinanced and proceed with its business of making truck-forming attachments on a materially larger scale. The incoming corporation is said to be now in control of motor car, tire, axle, spring, forging and rolling mill factories. The new concern will obtain the Cook patents, under which the Redden is built. The distributing company will continue to be known as the Redden Motor Truck Co. and C. F. Redden will be retained as president and general manager.

PARTS SHOW NOT SUCCESSFUL

Cleveland, Ohio, Jan. 6—The first separate accessory show to be held in the motor car industry closed tonight in this city and the situation can be summed up only in the statement that the show was not a success. It was operated entirely separate from the regular motor show across the street and it was necessary for show visitors to pay two separate admissions if they cared to attend both shows. The result was that while thousands attended the car show, few went to the accessory show. This seems to indicate that the public will not pay money to attend a purely accessory show.

Since accessories are closely allied to cars and are always considered as an adjunct to the car business, it is the belief of trade leaders here that an accessory show cannot be a success unless it is made a part of the car exhibit. This is taken to mean that when the accessory show is held in a separate building as was the case here, one admission should cover both shows. With this arrangement the show visitor

would pay for admission to both exhibits when he bought his ticket and naturally would feel inclined to use both sections of it.

There were eighty exhibitors in the accessory show. The proposition was promoted by the people in the M. & M. Co., an accessory house, and the attendance was very unsatisfactory to the management.

ENGER IS DEAD

Detroit, Jan. 9.—F. E. Enger, president of the Enger Motor Car Co., Cincinnati, is dead. Mr. Enger, who was reported to be one of the wealthiest men in Cincinnati, and who recently formed the motor car concern that bears his name, with a capital stock of \$3,000,000, shot and killed himself at the factory office. He was in ill health for several months.

FORD SMELTER MAY OPERATE

Detroit, Jan. 8.—Henry Ford, Horace H. Rackham and Frank L. Klingensmith furnished a \$10,000,000 bond last Saturday which was accepted by the court, to indemnify the Dodge brothers against the loss of any part of the \$55,000,000 surplus assets of the Ford Motor Co., which they wish distributed in the form of special dividends. The hearing before Wayne County judges resulted in the order which allows the Ford company to proceed with the River Rouge smelter project which entails an outlay of \$12,000,000.

HUPP CAR NEAR FINISH

Detroit, Jan. 8.—The Hupmobile capital-to-capital car is nearing its final destination, Washington, D. C., and will attempt to reach New York during the show.

NEW FACTORY AT CANTON

Canton, Ohio, Jan. 8.—Arthur Holmes, formerly vice-president and chief engineer of the Franklin Motor Car Co., and C. H. Rockwell, former sales manager of the Franklin company, have combined with western capitalists and formed the Holmes Automobile Co., which they have incorporated for \$2,500,000. The company will make air-cooled engine motor cars, and will erect a huge plant in this city. Temporary offices have been opened and temporary manufacturing quarters obtained pending erection of buildings.

SELDEN HAS FORD UNIT

Detroit, Jan. 8.—After 18 months of exhaustive experiments, the Selden Mfg. Co. has begun an active, countrywide campaign to introduce the Samson load carrying unit. Its function is to relieve the Ford rear axle of all weight from load when the chassis is converted into a light truck, and to supply a powerful, rigid brace to the Ford spring hangers and wheels. This is accomplished by two strong brackets with their auxiliary springs, and two special ball bearings which assemble on the axle housing.

G. M. Subsidiaries Cancel Charters

Seven Concerns Cease Working Under Old Incorporation and File New Papers

DETROIT, Jan. 8 — Seven subsidiary companies of the General Motors Co. have canceled the charters under which they have been operating and have filed new articles of incorporation with the secretary of state in Lansing. The incorporators for each company are W. C. Durnat, T. S. Merrill and H. N. Rice and the capital stock of each is \$10,000.

The companies reincorporating and the authorized capital stock of each under the earlier incorporation are: Buick Motor Co., Flint, \$2,600,000; General Motors Truck Co., Pontiac, \$250,000; Jackson-Church-Wileox Co. of Saginaw, \$250,000; Northway Motor & Mfg. Co., Detroit, \$1,000,000; Oakland Car Co. of Michigan, Pontiac, \$800,000; Olds Motor Works, Lansing, \$4,000,000; Weston-Mott Co., Flint, \$1,500,000.

General Motors, in order to affect greater economy in operation, took over Jan. 1, the entire manufacturing operation of those companies in which it heretofore owned entire capital stock as holding company. These companies, which have been incorporated for ten thousand each, will be sales companies for products manufactured by various manufacturing divisions of General Motors. There will be no change in management nor manufacturing operations of any division. All subsidiary companies are now known as divisions.

COLUMBIA MOTOR AMENDS

Detroit, Jan. 8.—The Columbia Motors Co. has filed amendments to its articles of association with the county clerk. The amendments were made at a meeting of the stockholders held in this city in October, and were arranged to permit the company to manufacture and assemble from any kind of metal, wood or other material, or combinations of materials, any and all kinds of castings, implements, tools, fixtures and machinery and any other articles of commerce ordinarily made in a machine shop or foundry. It was also arranged by an article of amendment that Detroit be made the principal place of business in Michigan.

FEDERAL TO MAKE NEW TRUCKS

Detroit, Jan. 8.—The Federal Motor Truck Co. shortly will begin the manufacture of two new trucks of 1-ton and 5-ton proportions. Mechanically, they will be somewhat similar to the present 3½-ton truck which the company has been manufacturing for the last three years, and the 5-ton model will include the worm-drive rear axle, heavy motor with five-bearing crankshaft of nickel chrome steel, force feed lubrication operated at a pres-

sure of 150 lb., feeding all bearings including the piston wrist pins. Complete specifications have not yet been arranged and will be announced at a later date.

CROWTHER PRODUCTION TO BEGIN

Rochester, N. Y., Jan. 5.—The Crowther-Duryen Motor Co., this city, is about to begin the manufacturing of its cars. One hundred cars, it is stated, are being assembled at the present time at the factory in Ridgeway avenue.

DETROIT FIRM IN LAND DEAL

Detroit, Jan. 9.—A land purchase involving \$250,000 was made last week in Milwaukee by a Detroit motor car concern, the name of which is not known at this time. It is reported that the company making the purchase will open a large plant in Milwaukee and will employ several thousand men. The land bought comprises 188 lots and 35 acres along the right-of-way of the C. & M. & St. P. railroad.

TO CENTRALIZE TRACTOR PLANTS

Chicago, Jan. 6.—Montgomery Ward & Co., Chicago, purchased the plant and good will of the Field-Brundage Co., maker of gasoline engines at Jackson, Mich., and will move the entire outfit to Springfield, Ill. The new industry will be added to the Racine-Sattley plant in Springfield. Montgomery Ward plans to centralize in Springfield the manufacture of all kinds of tractors and gasoline power machinery controlled by them, and the purchase of the Sattley Plow Co.'s plant last July was the initial step in this program. A hundred additional men will be employed to manufacture gasoline engines, varying in size from 1 to 25 hp. Plans for new buildings are now under way.

DELAWARE'S MOTOR LEGISLATION

Wilmington, Del., Jan. 8.—At the session of the Delaware legislature, which will get down to business in a week or so, an effort will be made to secure some motor car legislation. Among other things, there will probably be a bill requiring all vehicles using the roads at night to carry lights. There will be another to prohibit constables and other officers collecting fines for alleged violations of the law without adjudication before a magistrate, who will be required to ascertain the facts at a hearing, unless a plea of guilty is entered, and then the magistrate will collect the fine. Of course, these are only tentative plans, but they are about in shape for presentation to the legislature.

Germany Improves Its Truck Design

Commercial Vehicles Are Stronger but Lighter, Due to Electric Types Gain—New Batteries Features

By E. A. Langdon

WHILE passenger car design has made comparatively little progress in Germany since the outbreak of the war, motor truck construction has been greatly improved and the scope of both gasoline and electric commercial vehicles has been considerably widened. Strength and light weight are the features which most impress one in inspecting these machines, both being due to the need for economy in both construction and operation and to the use of lighter materials such as steel-reinforcement, frames, hydraulic spring systems, instead of steel spring suspension, and similar innovations.

Electric Current Is Cheap

The number of electric trucks has been greatly augmented, the ever-present necessity for economy being partially responsible for their popularity since current is unusually inexpensive, due to the abundance of coal Germany is mining from the northern section of France occupied by its armies. Highly efficient batteries of a new type have been developed because the demand for lead by the munitions factories rendered lead cells out of the question and the scarcity of nickel in Germany prevents the extensive use of the nickel-iron type. Gas batteries in which slightly acid water is decomposed by the current entering into oxygen and hydrogen are said to be used in large numbers as reserve sources of current in stationary plants. When the oxygen and hydrogen is released from compression in the cathode and anode spaces through reduction valves they again combine as water, liberating current to the amount originally absorbed in the process of decomposition.

While gas obtained from distilled coal constitutes a large percentage of the motor vehicle fuel used in the interior of the German Empire, gasoline is used almost entirely in military operations. The Germans consider their gasoline supply, at least sufficient for the needs of the army, to be secure for an indefinite period.

There are not many instances which illustrate so well the change industrial Germany has undergone during the last 2 years as the motor car situation in the interior of the empire. For life in general does not differ so very much from that in a normally operating country; the number of able-bodied men in the streets is considerably above what outsiders would imagine and the people are fully as busy as in times of peace.

However, the moment one leaves a home, store or factory and enters the street, the abnormal condition of German existence

becomes evident, for there is an absurdly small number of passenger cars, and what there are consist of old, invalid hacks—vehicles which nobody would think of using in normal times—and at the same time there is a very great number of commercial vehicles, but these, too, are of an entirely different type from what was seen before the war. Let us consider both of these phenomena.

Passenger cars, like all things which are not a matter of absolute necessity, have become utterly negligible in German eyes—principally because they had to. The military operations at the front could easily employ all passenger cars German and Austrian factories could turn out, and more; and the absolute subjection of individual interests to those of the state has resulted in the drafting into service of every car which is at least 40 per cent efficient. These cars are used for the extremely rough work which frontal operations necessitate; and the result is that every part of the car suffers, though not in equal degree. Some of these machines, as has been described in a former article, are overhauled in field vehicle hospitals, of which there are several at each front, and by this expedient the life of each car is increased, on an average, by 100 to 200 per cent. However, finally the time arrives when the car can no longer be kept serviceable in this fashion, and when, in times of peace, it would be consigned without mercy to the junk heap. In war, however, the junk heap is merely the assorting department for the materials needed by the divers factories of the empire. Hence, these unserviceable cars are taken to one of the enormous plants handling this work of assorting waste materials—there are, in all, five such plants in Germany and Austria, employing in all close to 80,000 persons—where they are taken apart and segregated.

Some parts of these disassembled cars with slight chemical treatment can be used over in assembled cars which are continually being built for service at the front; other parts are put aside to be melted and entirely refashioned; whereas a minimum quantity of parts is always placed aside and used in the makeup of the passenger vehicles, police and ambulance wagons which are absolutely necessary in the interior. It stands to reason that these latter classes of vehicles are of a lamentable kind, most of the time entirely devoid of any design, and built rather along lines

of expediency than of harmony or looks.

As for trucks, the difference between the importance given to them and that allowed for pleasure cars is most striking, for commercial vehicles are not only, without exception, harmoniously and suitably designed, but every one gives a decided impression of strength, coupled with light weight. The latter point is the result of two conditions; first, the necessity of economizing all sources of energy; second, the use of lighter materials than were the vogue before the war. These lighter materials include spruce frames stayed by steel braces, as well as combinations with other principles of construction. It is surprising to an observer not accustomed to these types of vehicles what strength can be obtained by these means, if proper weight distribution is had by suitably designed braces and stays and if the suspension is ample. German engineers are not tempted to false economy in this latter regard.

Hydraulic Spring System Used

Hydraulic spring systems, often including a set of different-sized cylinders arranged in suitable series to take gradually varying shocks, have become very common during the last 2 years. Some of these hydraulic shock absorbers, which, by the way, have almost completely taken the place of steel springs on commercial vehicles, are not working on the principle of internal friction in the liquid or between the liquid and arduous passages, but are so constructed as to utilize the resistance of the container against an outward radial stress, whereby advantage is taken of the full tensile strength of the metal.

In regard to economy of energy—the word "fuel" being purposely avoided in this instance—the number of electric trucks has increased enormously ever since the outbreak of the war, and is still increasing, for all purposes where motor cars are used on good roads; and, generally speaking, all roads in the industrial sections of the empire are good. Electricity is one of those many commodities the production of which is now under governmental supervision, but current is surprisingly cheap; the explanation being, very likely, that the Germans are deriving great quantities of coal from the mines in the territory held in France. In many cases, where numerous trucks travel along fixed lines of transportation, as between industrial centers of moderate distance—railroads being used chiefly for purely military passenger and freight transports—the

vehicles are propelled by single or double electric motors in place on the rear axles, current being drawn from overhead conduits by means of a trolley.

Apropos of these conditions, it is interesting to note that a great many lead batteries which served as reserve sources of current in stationary plants have been supplanted by an entirely different type of battery, as lead is needed in the making of ammunition. These novel batteries are said, in a number of cases, to be of the gas type, wherein water with a slight acid percentage is decomposed by the current upon entering, is stored in cathode and anode spaces in form of oxygen and hydrogen, being compressed there by suitably designed mechanism, and when the battery is drawn upon, the gases leave from their chambers through reduction valves in proper proportions and again combine to water, freeing the amount of electricity first absorbed in the decomposition of the liquid.

Platinum Powder for Battery

The poles of this battery are faced with "Platinmohr," black amorphous powder of platinum, which is at once a good conductor of electricity and a good catalyzing agent, being used to a great extent in the making of sulphuric acid, one of Germany's most important industries. The use of this material for batteries show how the industries of the empire have become linked, and, as it were, reshaped along lines of "interchangeability of parts." The sulphuric-acid industry has been drawn upon for much of the platinum used there and is now using in place of the platinum method, a new kind of "contact process," as they call it. This is only another illustration of how, so to speak, not a molecule of matter is lost within the empire, no matter how great a quantity is shot and burned away at the battlefield.

The fuel of the cars used at the front consists almost exclusively of gasoline, and the reason for this is that hundreds of thousands of soldiers are well familiar with the operation of gasoline engine and average motor cars, as well as with the chief points of its construction; consequently the risk of the personal equation is smaller in the case of the average gasoline car than if any other type of vehicle were used. Moreover, the Austrian oil fields in Poland, the wells of the occupied Russian territory and what oil and oil products were imported from Roumania heretofore are ample for the requirements of the field cars, and the more perfect organization developed during the war has quite overcome the need of using industrial alcohol, or benzol, for that matter.

One of the difficulties experienced by German engineers lies in the terminals of spark plugs. Platinum, used solid or as a coat, is absolutely unobtainable, as Russia, the chief former source of supply, is now of course shut off, save for small quantities which find their way into Ger-

many via Sweden, or which were taken from craft captured in the Baltic. The Germans have been working on an "Er-satz," or substitute, for some time, and while it is not used generally as yet, engineers claim to obtain surprisingly fair results therefrom. They are, of course, very secretive about the matter, but from what the writer could learn, in a vague manner here and there, it would seem that the substitute is an alloy of gold and a metal of the radium group, very likely uranium. Some experiments made with a selenium compound, or rather alloy, are also said to have been fairly satisfactory, except for the variable conductivity of this element which changes with the degree of light or radiation to which it is exposed; which fact caused fluctuations and disturbances throughout the ignition system of the car and led to the abandoning of the idea.

One peculiar innovation was witnessed by me some time ago when visiting the western front. It was a cylinder head made of a material which resembled wire-reinforced glass, and, it was stated, was indeed of a similar composition, namely, an oxide of silica made in one of the chemical factories along the Main and reinforced by a skeleton of steel wire. The valve seats, made of nickel steel, are put in place when the head is being made and still at a very high temperature. These cylinder heads are, except for the connecting ways to the manifolds, without jackets; small wire points protrude from the inner wire skeleton and are cooled by the stream of air directed upward by the inclined fan.

While the French and English armies use thousands of cars fitted with wire wheels, the Germans have practically departed from their use, principally because the empire's enormous lumber reserves permit of easy and cheap wholesale production of good wooden wheels, while every metal is comparatively scarce and economy is necessary. The metal which has been less subject to this rule than any other seems to be aluminum, for which new uses are found every day and which is produced very cheaply by the electric furnace process.

The aluminum powder, or Thermit, process of welding has also become of tremendous importance, and the equipment for this process forms part of every car containing the repairshop equipment needed for quick repairs of motor cars and trucks. These traveling shops contain a simple but complete outfit for welding, a lathe, punch, a small drop forge and a full set of minor tools, so that almost any repair can be made anywhere and at any time, the necessary power being furnished by the motor of the repair wagon. These traveling repairshops are, moreover, fitted with wireless telephones and small generators geared to their motors, so that they can easily and immediately get into communication with the nearest motor depart-

ment of the army to which they belong. The crew consists of three men, each one an expert driver, mechanic and electrician.

Every kind of labor which is connected with the driving and repairing of cars is plentifully supplied to the army. The boys between 17 and 19 years of age are trained in the school, with a view to preparing them for military service when they reach the full age, and from among those showing mechanical ability and inclination the future car operators are picked. These are trained by experts, not only in driving, but in repairing every conceivable kind of accident or damage, as well as first aid to the injured; so that in all likelihood Germany will possess, when the war is over, the greatest number of motor vehicle expert drivers among all countries in Europe, which will make these young men vastly superior in earning power and serviceableness to what they would have been without this training.

Drivers Are Picked Carefully

Wherever possible, the drivers are chosen from the soldiers knowing the language of the enemy the particular army is in contact with, so that if by accident they come into possession of military information they are in a position to report it with the greatest possible speed to their superiors. A stranger would be most surprised to note the high percentage of intellectual men, engineers as well as students of medicine, languages and theology, among the contingent of cars attached to the German army.

While the construction of cars as heretofore mentioned, has become much simpler, no desirable accessories are spared to make operation efficient. For instance, spring types of self-starters are almost universally used where hand cranking is not retained; and speedometer, thermometer and barometer form part of every vehicle's equipment; the same thing may be said to hold true of the trench periscope, a vertical tube with inclined mirrors at each end, and about 6 feet long; a small heliograph, detailed map, compass, etc.

There is no doubt that when the war is over, the motor car industry of Germany will emerge as something reborn and as far advanced over what it was before July 31, 1914, as it was at the latter date over 1900, both because of the improvements and developments made during the war and on account of the practical annihilation of most draft animals, except what specimens were reserved for stock breeding. But there is little likelihood of the German peasant ever turning to horses again for his agricultural work. What he will look for will be a moderately-priced, highly-reliable, simple, efficient car, which can be rapidly transformed into a tractor. For such a machine Germany will offer a wonderful market, because, in spite of the empire's enormous industry, agriculture is still one of the two greatest, if not the greatest, method of occupation of the German people.





The Readers' Clearing House



Harry Hartz, Claimant of Title of Master Junior Driver of World, Rebuilds

LOS ANGELES—Editor MOTOR AGE—
If anyone had told me a year ago that at this time I would be riding in a reconstructed Ford racing creation that has cost me only \$375 and several weeks' labor, and is capable of a speed of 70 m.p.h., I would have told that person "it can't be done." However, that is just what I am doing at the present time—thanks to several kind friends and a railway freight train.

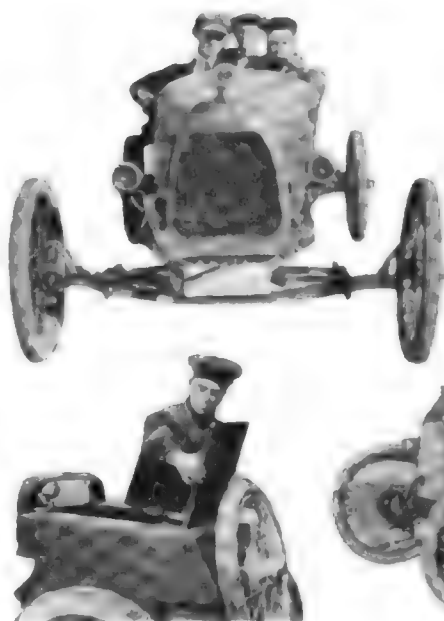
I purchased the chassis for the creation which I had planned many moons ago, after said chassis had been involved in an argument with a freight train in which the freight train came out victorious to the extent of nearly demolishing the Ford. Relatives of the deceased driver were lenient with me, selling me what remained for the small sum of \$100. When I took delivery on the chassis and told my friends of my intentions, I had their well wishes as well as a broom and a dust pan in which to collect the remains. The channel iron frame bore a close resemblance to a pretzel. The front axle, though in fairly good shape, gave testimony to having struck something. Two wheels were completely demolished, the differential housing and rear end were impossible, as were the steering-gear and, needless to say, the body, tanks and radiator.

Junk Parts Used

Therefore, when my construction work started, I had a badly-bent frame, two wooden wheels, a front axle several inches out of true, a torque-tube and driving shaft and a motor and gearset, the latter two parts being intact and in fine shape. With the above-enumerated parts, I started to build a speedster.

My plans called for a racing car from stem to stern and I started to prepare the motor according to specifications. Before I got any further than oil-grooving the bearings, balancing the pistons, enlarging the valves and portholes, my ideas changed and I decided to make a semi-speedster type car. Therefore, with the exception of adding a Miller carbureter and substituting a high-tension chain-driven Bosch magneto for the conventional Ford generator and coil-ignition system, the motor closely resembles the stock product.

The front axle was bent in a radius,



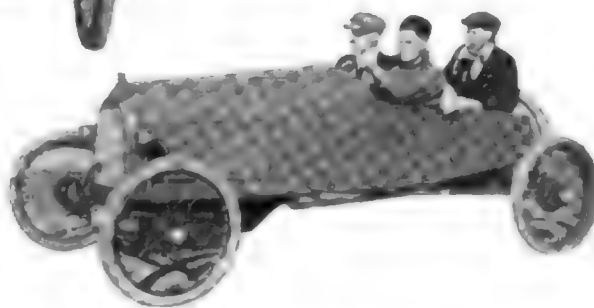
By Harry Hartz

starting at the arches which lowered the spring bolts $2\frac{1}{4}$ in. The frame was bent up $2\frac{1}{4}$ in. at a point starting about 2 ft. forward of the rear end. This operation lowered the entire car $2\frac{1}{4}$ in. The springs were then worked over, taking one leaf out of each, rear and front, and flattening whole springs 2 in., this entire operation lowering the entire car $4\frac{1}{4}$ in.

In the meantime, I had purchased a complete second-hand rear-end assembly, with the exception of torque-tube and driving-shaft, for \$15. The rear end purchased was immediately torn down and ball-bearing thrust-bearings were substituted for the bronze and steel thrust plates to take up the end strain on the ring gear and differential. This gave me a 100 per cent easier-running rear axle. Another innovation in the rear end was the substitution of 2 $5/7$ to 1 for the regulation 3.64 to 1 rear axle gears.

After I had overhauled and rebuilt the rear end, I next turned my attention to the chassis itself. I had the frame straightened and re-riveted and placed the springs and axles on same. The motor was then placed and a set of 28 by 3 Houk interchangeable cyclecar wheels which I had purchased some time before for my miniature racing car were placed on the axle shafts. The car was then set on the wheels and the steering gear was placed. This part of the car is strictly stock except that I substituted a flexible steering wheel for the regulation device. This wheel is made from a solid sheet of $\frac{1}{2}$ -in. spring steel with the spiders and rim cut from solid sheet. This provides a sturdy wheel

Ford Into Speedster— Read His Own Story Telling How He Made the Change



which will spring and take away a great deal of the vibration.

While I had been working on other parts of the car, I placed an order for a flexible, Fiat-type radiator with a Los Angeles radiator manufacturer, which cost me \$40. This is one of the finest types made. I could have bought one at a lower price, but made up my mind that in this particular instance, I wanted the best. The radiator was placed on the chassis very soon after the steering-gear had been placed.

The gasoline tank was made and placed on the rear end of the frame, hanging back of the rear axle. This made the usually-unsightly Ford rear end look much better.

By the time I had hung this tank, I had made up my mind to make the car a three-passenger touring creation rather than the conventional two-passenger racing type. Therefore, I redesigned my body. Instead of a flaring tail which I had planned, narrowing in the rear, I left a swell just in back of the front seat, large enough that I could place a seat for one passenger in the rear. When not in use, the back of this seat slides up and folds over the hole, making the car appear to be only for two-passengers. I carry my extra wheel on the rear of the car on a specially-prepared wheel bracket.

The car when nearly finished was equipped with a foot accelerator and a Stewart vacuum-feed gasoline system. As my gasoline fuel tank hangs on the rear on a level with the rear axle, it was necessary that means be provided whereby the gasoline could be fed to the carbureter. The pump system offered so many

however, but in this case is hardly an element inasmuch as 32-in. tires are amply big to take care of a Ford.

2—Yes.

3—A 2 to 1 ratio is too large for a Ford car equipped with 32-in. tires. A 2½ to 1 ratio is low enough. There is no way of judging what the speed might be.

4—No.

5—The amount of space in the cylinder between the point where the top of the piston comes on the top of the stroke and the point where the top of the piston comes on the bottom of the stroke. It is figured by squaring the bore and multiplying by .7854 times the stroke times the number of cylinders.

MERCEDEZ WITH FLAT-TYPE FRONT Can Place Confidence in Speedometer if in Good Condition

Victoria, Tex.—Editor MOTOR AGE—I have a Mercedes roadster 1914 model. Give some suggestions as to rebuilding the front end of same with a Flat-type radiator and streamline hood instead of the present break with side lights. What would be the approximate cost?

2—Although the car has only been driven

up on a hill on high the same as a six, eight or twelve-cylinder?

2—State what the car is geared at.

3—Give the size of the cylinders.

4—What is the piston displacement in inches?

5—How many miles can I get out of a gallon of gasoline?—Oscar Brown.

1—We cannot claim that it is possible that the four-cylinder 16-valve Stutz motor will slow down in high speed going up a hill, the same as can be done with the multiple-cylinder motor. However, it is unnecessary to attain great speed on the approach of a hill in order to negotiate the same. You no doubt appreciate that the multiple-cylinder afford more impulses in the motor, which makes it possible to decrease the speed or increase it as may be desired by the driver in negotiating steep hills.

2—The Stutz Bearcat model in which the 16-valve four-cylinder motor is installed will be geared 3½ to 1, or 49-14.

3—This motor has a bore of 4½ inches and a 6-inch stroke.

4—360.78.

5—As to the miles per gallon would say no official tests have been made, but in the

better off than you are now. Let a good mechanic examine your car and tell you what is wrong with it.

MAY NOT INCREASE SPEED OF CAR There is a Limit to Higher Gearing and Bigger Wheels

Greenville, O.—Editor MOTOR AGE—I am building a racing car and want to know which will be the better and give the best results to use, the present 3½ to 1 gear ratio and change the wheels to 34x4 or change the ratio to 2½ to 1 and get demountable wire wheels and use 31x4 tires?

2—How much difference will there be in the speed of the car with these changes? The present equipment is 3½ to 1 with 30x3½ tires.

3—What I want to know without any more correspondence is, will the car be safe with 34x4 or 35x4 wood wheels with good cord tires? This car will line up 75 m.p.h. with 32x3½ tires.

4—I have the cylinder head combustion chamber, filled in with the gas welding system which will increase the compression and is going to increase the lift and the character of the valves. I think this car should do 90 m.p.h. with these changes.—James Tephart.

1-2-3—You tell us about the gear ratio and tire sizes, but unfortunately omit the very necessary information as to what kind of a motor you have, bore and stroke,

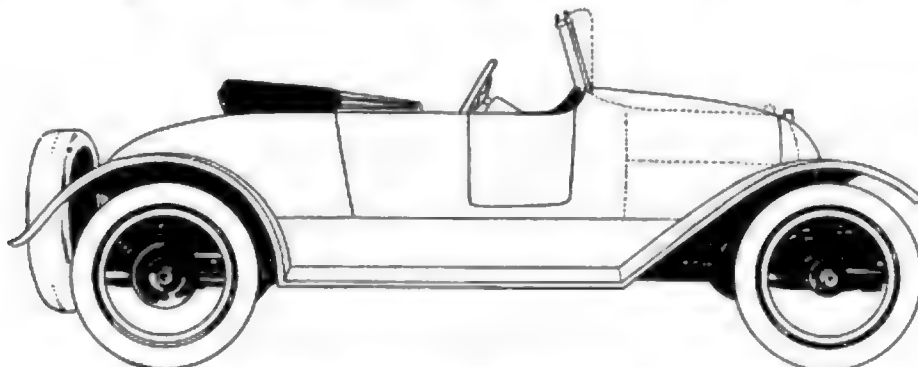


Fig. 3—Proposed alterations of Mercedes embodying Flat-type radiator. The new hood not only would follow the radiator lines but also would balance well with the rear deck

10,000 ml. It is now only able to attain a speed of 60 m.p.h. What would MOTOR AGE suggest to gain more speed?

3—Is it right to place confidence in the exact registration of the Jones speedometer with which the car is equipped?

4—In damp climates, is it impracticable to use wire wheels on a car?—C. R. Holland.

A drawing is published in Fig. 3, which will give you some idea of the appearance of the car with a Flat-type of radiator, and a streamline body. It is an impossibility to give an accurate figure on the cost of such alterations. It depends entirely on who does it and how it is done.

2—A complete overhauling and adjustment of parts. There is no reason why this car needs to be altered to get more speed.

3—Yes, if it is not worn out or damaged.

4—No. We have never heard the statement made that it is and surely see no reason why it should be.

ABOUT THE SIXTEEN-VALVE STUTZ Cannot Expect Four to Act Same as Multiple-Impulse Motor

St. Louis, Mo.—Editor MOTOR AGE—Will the new Stutz four-cylinder 16-valve engine slow down on high going up a hill and then pick

first experimental motor 16½ miles were secured on one gallon of gasoline. However, the company does not wish to guarantee this mileage inasmuch as no official tests have been made.

His Car Lacks Power

Cushing, Okla.—Editor MOTOR AGE—I have a 1916 Apperson Six which has been run between 6000 and 7000 ml. At first this car made 60 m.p.h. without the least vibration, but now will hardly make 40. It seems as though something holds the car back. I have tried a carbon remover, but it has not done much good. When the car gets to 30 m.p.h. the cylinders begin to miss. What is the trouble?—Lionel E. Gaunt.

With all due regard to your interest in the matter, Mr. Gaunt, stop and consider the question you are presenting to us. What if you went to a watchmaker and said, "I bought this watch a year ago and it ran fine until a month ago, when it started losing time. What is the matter?" Do you think that watchmaker could tell you offhand what the trouble was without a thorough examination of the instrument? The lack of power in your car may be due to any one of a long list of troubles and if we were to enumerate all of these troubles you would be no

etc. It will be safe to use 34 by 4 or 35 by 4 wood wheels.

4—Do not think that the speed of a car can be increased everlastingly by stepping up the gears and using larger wheels. It is very possible that higher gearing and larger wheels would reduce your speed rather than increase it. It depends entirely on what weight the motor has to carry in proportion to its power.

OILING METHOD IN FORD RACERS Regular Splash System in Conjunction With Hand Pump

Lebanon, Pa.—Editor MOTOR AGE—What method of oiling was used in the most successful of the Ford racers?

2—Did any of them change the steering mechanism in any way, except lowering the steering wheel?

3—Would MOTOR AGE advise the removal of the flywheel magnets in order to reduce the weight of the flywheel?

4—Did any of the fast cars use the regular Ford carburetors?—A. S. Kreider.

1—The regular Ford splash system in conjunction with a hand pump operated by the mechanic which fed oil directly into the crankcase.

2—No.

3—In some of the fast cars the magnets

were removed; in others they were not. Make all other alterations first and then try this. You can readily determine by this method whether the lighter flywheel increases the car speed.

4—No.

REASON FOR SMALL FRONT TIRES Power Applied to Rear Wheels Makes Greater Strain There

Galesburg, Ill.—Editor *MOTOR AGE*—Which is the more practical—demountable rims or demountable wheels?

2—Why is the Ford equipped with a smaller tire in front? Would they have the same amount of power, be as easily controlled and give the same mileage per gallon if $3\frac{1}{4}$ -in. tires were used?

3—Does *MOTOR AGE* advise oversize tires?—Lem Foster.

1—It seems to be a matter of varying opinion. Demountable wheels are generally quicker to handle than demountable rims although more cumbersome to carry as extras.

2—Because there is less strain on the front tires than on the rear. It must be remembered that the rear tires take the drive from the motor. The larger tires

ing difficult. Of course, we are assuming that the platinum points are set properly with a clearance of .025 in. If the above is the case a new transformer would not remedy a weak magneto.

WANTS TO MAKE BUICK SPEEDY Sketch Given of Model 21 Stripped Down as a Racer

Marinette, Wis.—Editor *MOTOR AGE*—Give the bore and stroke of the Buick Models 17 and 21.

2—Could a Model 17 be used in a Model 21 frame without too much trouble? If so, kindly give a diagram showing the changes to be made and also showing how to tilt the steering wheel.

3—Give a sketch of the Model 21 touring as a speedster with the gasoline and oil tank in the rear.—A. N. S.

1—The size is $4\frac{1}{4}$ by $4\frac{1}{2}$ in each instance.

2—Not having drawing showing the dimensions available we cannot give you the plans you ask for. The steering wheel may be tilted by merely dropping it down to the desired height and setting the gears to take care of the new location.

3—The sketch you ask for is shown in Fig. 4.

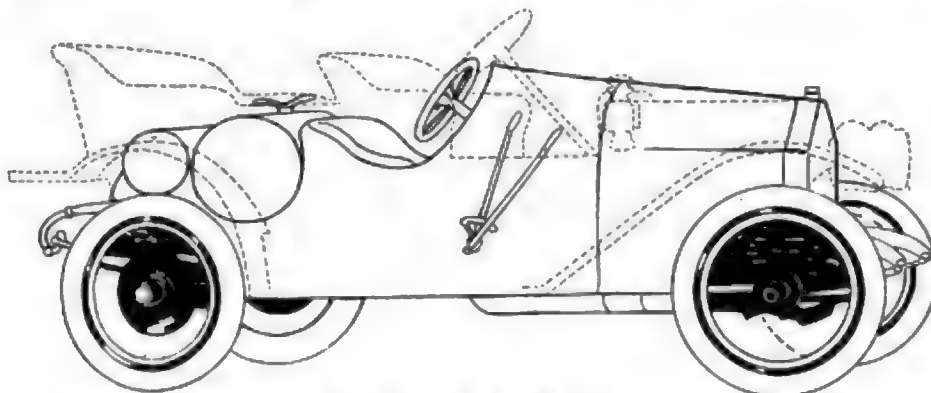


Fig. 4—A model 21 Buick can be rebuilt to appear as shown in this sketch. This follows the reader's idea of a gasoline and oil tank in the rear

are more economical as far as mileage is concerned than the smaller ones. Although there is slightly more road resistance it is not enough to appreciably reduce the gasoline mileage.

3—Yes.

NO START WITH BATTERY SWITCH A and Circuit-Breaker Wires Probably Connected Wrong Way

Grand Junction, Colo.—Editor *MOTOR AGE*—I have a Buick Model 29 touring car equipped with a Spiltdorf transformer and 8Htdorf magneto, which I am unable to start with the switch on the battery side. I can crank it with the switch on the magneto side, but as the weather gets colder, it makes starting harder.

This is what has been done to find the trouble: I have put in four new dry cells testing 30 amperes, bought a new tubular Spiltdorf transformer and had it wired up by an expert, using new wires, which proved to be no better than original transformer. However, by changing the wires on the contact posts of the magneto, we found it would run on the battery side and not on the magneto side. There is plenty of platinum on the breaker points in the breaker box, adjusted according to a Spiltdorf gauge. The magneto is a Model T. B.—C. E. K.

Based upon the information you give us we would assume that the battery current went through the magneto where the A wire and the circuit-breaker wires on the magneto were connected the wrong way. This would have a tendency to make start-

Tire Size and Car Performance

Sherwood, N. D.—Editor *MOTOR AGE*—My car has a 31x4 tire. Now, if I put on a larger wheel and use a 33x4 tire what effect will that have on the efficiency of the motor? The gear is $4\frac{1}{4}$ to 1. I contend that the larger tire will diminish the power of the motor, that is the car will not climb a hill as well, will not pull through mud or sand as well, and will not pick up in speed near as quick, but will probably attain a higher rate of speed after getting started. Am I right or wrong?—E. M. Haseltine.

You are right, although the difference in tire size will not make a surprising difference in car performance.

Direction of Racers

Kirkwood, Mo.—Editor *MOTOR AGE*—Tell me if there is any scientific reason for running races around to the left, or is it a custom?—Robert Craig, Jr.

There is no scientific reason for the direction of running races. It is time-worn custom which has always been a part of horse racing, and the custom has been followed on motor car speedways.

Old Ford Will Not Pull

South Haven, Kan.—Editor *MOTOR AGE*—What is the matter with a 1911 Ford touring car? The carburetor is in good shape, and the car runs like a house afire, then again it will not pull one's hat off. The car was recently overhauled from stem to stern; new valves and push rods installed, also one new ring in each piston. This made no difference

in the car's behavior. We can find nothing wrong with the engine or accessories.

2—I am going to put one K-P ring on each piston of my 1918 twin Harley-Davidson motorcycle. Would it be best to put these in the upper middle or lower ring groove?—Irl K. Robinson.

1—A 1911 Ford might well be compared with an 80-year-old man. The wear and tear of a long existence slows them down. Your information is indeed meager. So much so that we can give you no clue to the trouble unless it is that the motor overheats.

2—The ring should be put in the upper groove so that the compression will be held as near the top of the piston as possible.

No Power in Old Car

Olympia, Wash.—Editor *MOTOR AGE*—I have a Studebaker 30, 1912 model. Why is it that this car has no power when it comes to pulling?

The valves have been ground and are in good shape. There are three new rings in each cylinder; there is no compression leak that I can find; the carburetor is in good shape, and it runs fine when not pulling.—R. M. Catu.

There are so many reasons why this car may not pull that we would have to enumerate practically all mechanical troubles

found in a motor car. It may be that the car is just naturally worn out.

Explosive Pressure is Heat

Las Vegas, N. M.—Editor *MOTOR AGE*—The Buick company claims that its valve-in-the-head motor is superior to other types on account of the fact that there is less area to be water-jacketed, therefore less loss of heat, and that heat is what actuates the piston. Is it true that heat moves the piston, or is it the explosive action of the rapidly burning gas?

2—Has the valve-in-the-head motor any advantage over the T and L-head motors?

3—Is the Buick D-4-35 as successful a car as the 1916 six-cylinder?—Clyde D. Williams.

1—Explosive pressure is caused by heat.

2—Yes, slightly more efficient.

3—Cannot say.

Gummy Radiator Compound

Los Angeles, Cal.—Editor *MOTOR AGE*—The honeycomb radiator in my Lozier car sprung a leak some time ago. A garage man put in a radiator compound and it stopped the circulation. A can of lye and muriatic acid have failed to remove it. Does *MOTOR AGE* know of anything else I can use? The pump works so fast that it pumps it nearly all out through the overflow.—J. R. Stead.

Without knowing the nature of the radiator compound we cannot give you a specific that will remove the clog. You should be very careful of radiator compounds. Solder is the real remedy.



the car was stolen and the owner was not liable, but later the theft theory was changed to that of civil trespass, and the owner was made liable for the foreman's conduct.

Why Buy a Car?—That there may be more than one reason for buying a motor car might be judged from the explanations given by the in-coming and the out-going sheriffs of a Montana county. Each bought a Cadillac. The out-going one said he wanted to enjoy himself for a few months. The other said he wanted help in his work.

New Directors for Lincoln Highway—Sidney D. Waldon, Detroit, and James A. Allison, Indianapolis, have been chosen members of the directorate of the Lincoln Highway Association. Mr. Waldon is a consulting engineer and has driven across country several times, being thoroughly familiar with types of road needed. Mr. Allison has been active in the affairs of the association since its inception.

Bad Roads Affect Market Produce—Texas commission merchants sometimes reject market produce that has been damaged solely by transportation over poor roads. It is said. Some of the farmers in a poor road district fit special springs on their vehicles, but this reduces capacity and incurs an expense which would go far toward paying taxes needed for good roads.

Number of Exhibits Limited—Because of the great demand for space at the Columbus, Ohio, show, it has been found necessary to limit the number of models to be displayed by the different agencies to three cars. More dealers will show this year than ever before, and despite the fact that the individual exhibitions will be limited, there will be a shortage of space.

Cars Increase in Southwest—Texas gained 61,632 registrations in 3 months during the latter part of 1916. Most of this gain was in the rural districts. Altogether Texas had 191,376 registered up to Dec. 1, the latest date at which figures are available. Among others of the Southwestern states, Oklahoma had 59,849; Arkansas, 15,423; Louisiana, 16,587, and New Mexico, 3,228.

Second Speed Down Mountains—The usual thing to do when driving down a mountain side is to hold the car with motor and brake, but when R. P. McCurdy of Pittsburgh went down Cove mountain with the temperature at 6 degrees and a heavy snow on the ground he used second speed to pull his car down. A spare gallon of oil froze solid on the trip, which was between Pittsburgh and Philadelphia.

To Improve Dangerous Crossings—The wooden bridges upon which motor traffic between Philadelphia and Atlantic City crosses railroad tracks at Atco, Ancora and Elm, N. J., are to be made safer. The county authorities and the railroad company will act together in widening the bridges, strengthening them and improving the approaches. These bridges are all on the famous White Horse pike.

Wandering Garage for Derelict Cars—Alfred Gill, once a Los Angeles bank clerk, and later a highway wanderer for his health, roams the vicinity of Los Angeles with a garage mounted on his Chevrolet. A small truck on the chassis carries tires, oil, tools and a small line of accessories. He is a familiar sight to tourists, and the upkeep on his garage is so low he is recovering his health with little actual cost to himself.

Twenty Millions for Roads—The government of the Province of Quebec will have \$20,000,000 for good roads this year. A bill to amend the Good Roads Act, and containing this provision, was passed recently. In 1912 the government borrowed \$10,000,000 for roads. Last year it borrowed \$5,000,000 more. Under the new law municipalities pay half the cost of provincial roads within their

boundaries. For municipal roads the government may pay a subsidy of not more than \$400 in any one year. Provincial roads are those built under the act of 1912 and the King Edward highway.

Ferry Gives Short Cut—Ferry service across the Colorado river, between Arizona and Nevada, has been installed near Searchlight, Nev. The new boat is 42 ft. long and 16 ft. wide, and has a capacity of three machines. Excellent landings are available on both banks of the river, and the roads to and from the landings are in good condition. The boat is gasoline-driven and has no cable. The

journey from Kingman to Searchlight can now be made in about 4 hr., and to Las Vegas in about 7 hr. The new service affords a short cut for tourists between northern Arizona and Nevada.

Club Issues 1917 Plates—Since the Chattanooga Automobile Club received permission to distribute new 1917 number plates, the secretary has issued more than 1,200, which represents a collection of about \$7,000.

To Show at Fair Only—Springfield, Ill., dealers will show only at the state fair this season. The proposition of holding a motor show at the state arsenal was discussed, but most of the dealers thought the show at the fair enough.

Any Claim for Damages?—The Trojan horse had nothing on a St. Louis mule. A woman in St. Louis was driving a motor car recently and hit a mule. Her shoulder was dislocated in the collision, but it is said not even the mule's disposition was dislocated.

Atlanta Show Date Set—The Atlanta, Ga., show will be held Feb. 24-March 4 at the auditorium. Sign posts at each exhibit will have roofs similar to those of the Japanese houses and will be decorated with Japanese characters. Red and white colors will be used.

He Did This on a Bet—C. H. Davis is not from Missouri, but when someone made a wager with him, or he made a wager with somebody else, that he could drive a Woods-Premier through the downtown streets of Denver with one arm as easily as anything, he proceeded to show he could. Charles F. Roehrig, secretary of the Denver Motor Club, did the tying of one arm. An official watcher was appointed. The showing lasted 6 hr. and was without accident.

County Court Re-Registration—Tennessee car owners need not pay a \$1 re-registration fee with the county court clerk since the Chattanooga Automobile Club carried a test case to court and obtained the ruling that the Secretary of State could issue new numbers but re-registration of same with the county court was unnecessary. Owners objected to paying for the registration of a number with the county court clerk as it duplicated the record kept by the Secretary of State.

Moth Balls Help Gasoline—Whether 'tis nobler to put the expensive gasoline in moth balls for safe storage or to put moth balls in the expensive gasoline for more mileage is no longer as much of a question since various Kansas chemists have undertaken the investigation of preparations claimed to decrease fuel cost. One chemist figures that 6 cents' worth of moth balls gives \$2.60 worth of naphthalene, which is used in preparations for motor car tanks to give more mileage.

Jersey Governor Plans State Road Tax—Governor-elect Walter E. Edge of New Jersey who takes his seat this month, is planning an easy and practical way to raise funds for permanent road improvement. The new governor wants to impose a state road tax of 10 cents on each \$1,000 valuation for 5 years, which would bring into the state a total of \$15,000,000 for good roads. It is expected that this or a similar plan will result in making Jersey roads the finest in the country.

Who Gets the Freak Numbers?—Fred Kuser, special agent of the New Jersey Motor Vehicle department in New York, gets Nos. 1, 2 and 3 of that state. Governor Martin G. Brumbaugh gets No. 1 in Pennsylvania; the state highway commissioner, Frank B. Black, No. 2; and the chief engineer of the highway department, William D. Uhler, No. 3. In Delaware first come was first served, and the holders of the first three digits in 1916 have them for another year, but Charles G. Guyer got the 13 and 23. Maryland gives these numbers to heavy motor trucks.

Coming Motor Events

RACES —1917—

May 19—Metropolitan Trophy, New York speedway.
†May 30—Indianapolis speedway.
†June 9—Chicago speedway.
June 23—Cincinnati speedway.
†July 4—Omaha speedway.
†July 14—Des Moines speedway.
†July 28—Tacoma speedway.
August 4—Kansas City speedway.
†September 3—Cincinnati speedway.
†September 18—Providence speedway.
†September 29—New York speedway.
October 6—Kansas City speedway.
October 13—Chicago speedway.
October 27—New York speedway.

†A. A. A. championship events for 1917.

MEETINGS

January 9-11—Midwinter meeting, Society of Automobile Engineers.

SHOWS

January 5-11—Milwaukee, Wis., show.
January 6-13—New York show.
January 12-20—Philadelphia show.
January 14-16—Rockford, Ill., show.
January 19-24—Manchester, N. H., show.
January 20-27—Detroit show.
January 20-27—Montreal, Can., show.
January 22-27—Oklahoma City show.
January 22-27—Rochester, N. Y., show.
January 23-27—Allentown, Pa., show.
January 23-27—Baltimore show.
January 25-27—Asheville, N. C., show.
January 27-February 3—Chicago show.
January 27-February 3—Columbus, Ohio, show.
January 27-February 5—York, Pa., show.
January 28-February 3—Wilmington, Del., show.
January 29-February 3—Buffalo show.
February 3-10—Minneapolis show.
February 5-10—Bangor, Me., show.
February 10-17—San Francisco show.
February 10-17—Hartford, Conn., show.
February 12-17—Kansas City show.
February 12-17—Louisville, Ky., show.
February 13-16—Grand Forks, N. D., show.
February 13-17—Sioux City, Ia., show.
February 14-17—Peoria, Ill., show.
February 19—Pittsfield, Mass., show.
February 19-24—Bridgeport, Conn., show.
February 19-24—Des Moines, Ia., show.
February 19-24—Duluth, Minn., show.
February 19-24—Grand Rapids, Mich., show.
February 19-24—St. Louis show.
February 19-24—Syracuse show.
February 24-March 4—Atlanta, Ga., show.
February 26-March 3—Omaha, Neb., show.
February 26-March 3—Great Falls, Mont., show.
February 26-March 3—Utica, N. Y., show.
March 1-3—Urbana, Mich., show.
March 3-10—Boston show.
March 3-10—Washington, D. C., show.
March 6-10—Fort Dodge, Ia., show.
March 14-17—Davenport, Ia., show.
March 14-17—Mason City, Ia., show.
March 18-23—Cedar Rapids, Ia., show.
April 4-7—Stockton, Cal., show.





assemble forty cars a day, the parts being obtained from Newcastle, Ind., Dayton, Ohio, and Cleveland, Ohio.

Barnhisel to General Tire—J. W. Barnhisel has opened the Kansas City office of the General Tire & Rubber Co., Akron, Ohio. Mr. Barnhisel was formerly secretary of the Motor & Machinists Supply Co.

Johnston to American Motors—R. B. Johnston has joined the staff of the American Motors Corp., New York and Plainfield, N. J., and will assist in the advertising and in the direction of sales. Mr. Johnston started the motor car column of the New York Sun and ran Leslie's motor bureau for a while. He also has been connected with the Chalmers company.

Steel Products to Move—The Detroit office of the Steel Products Co. will move to the Michigan Electric Welding plant in Detroit Feb. 1. Ray T. Middleton will continue as sales manager for the Steel Products Co. main plant at Cleveland, Ohio, and will have charge of Michigan Electric Welding sales also. The two companies were consolidated last summer.

Vacuum Oil Co. Builds—The Vacuum Oil Co., New York, expects to get into its new plant, now under construction near Paulsboro, N. J., by April 1. About 500 men will be employed. The location gives the company dock facilities for ocean steamers, and 18,000 ft. of railroad tracking will be provided for shipping. A pipe line under the Delaware connects the plant with the oil fields.

Electric Accessories Company Expands—Kansas City will have its first building devoted exclusively to electric motor car accessories when the E. A. Cowie Electric Co. opens its new mechanical department in a two-story building erected for this purpose. The business was founded in 1899 and is general sales agent in that territory for the Willard Storage Battery Co., and the official

repair shop for Gray & Davis, Simms Magneto Co. and other concerns. A branch is maintained at Wichita, Kan.

Dividends Declared

Herschell-Spillman Co.—The Herschell-Spillman Co., North Tonawanda, N. Y., paid a 100 per cent stock dividend Dec. 30 in addition to the regular quarterly cash dividend.

Smith Motor Truck Corp.—The Smith Motor Truck Corp., Chicago, has declared an initial dividend, payable Jan. 15, on preferred stock for the period from Nov. 27 to Dec. 31, at the rate of 8 per cent per annum.

Electric Storage Battery Co.—The Electric Storage Battery Co., Philadelphia, has declared a dividend of 1 per cent on common and preferred, payable Jan. 2 to stock of record Dec. 13.

Keystone Tire & Rubber Co.—The Keystone Tire & Rubber Co., Pittsburgh, has declared a quarterly dividend of 3 per cent on common and 2 per cent and an extra $\frac{1}{2}$ of 1 per cent on preferred.

Pierce-Arrow Motor Co.—The Pierce-Arrow Motor Co., Buffalo, N. Y., has declared an initial dividend at the rate of 8 per cent per annum on preferred, payable Jan. 2 to stock of record Dec. 20.

Packard Motor Co.—The Packard Motor Co., Detroit, has declared a quarterly dividend of 2 per cent, payable Feb. 1.

Declares Extra Dividend—The Hall Lamp Co. has declared an extra dividend of 2 per cent for December on the \$600,000 outstanding common stock, making a total of 4 per cent for the month.

Hupp Dividend Declared—The Hupp Motor Car Corp. has declared a dividend of 1 $\frac{1}{2}$ per cent payable Jan. 2 to stockholders of record Dec. 20.

Recent Incorporations

Akron, Ohio—Kendall Tire & Rubber Co.; capital stock, \$500,000; incorporators, Lucas H. Kendall, K. P. Kahle, Addison M. George, V. G. Warner and Carl E. Killian.

Akron, Ohio—Actual Gas Saver & Auto Air Brake Co.; capital stock, \$10,000; to manufacture accessories; incorporators, Carl M. Myers, J. Alvin Siller, Charles K. Strobel, I. C. Creighton and Mary E. Siller.

Bellevue, Ohio—Kauffman Mfg. Co.; to manufacture motor car parts; capital stock, \$50,000; incorporators, J. G. Morris, J. S. Kauffman, Brad D. Hlatt, Charles M. Johnson.

Bridgeport, Conn.—Connecticut Marine & Motor Appliance Co.; capital stock, \$50,000; incorporators, Frederick LePan, Roger O. Foust and T. R. Chaffield.

Camden, N. J.—Federal Automobile & Supply Co.; capital stock, \$100,000; incorporators, C. M. Reeves, W. A. Walton and T. R. Roberts.

Canal Fulton, Ohio—Keller Motor Company; capital stock, \$10,000; incorporators, A. P. Keller, O. F. Keller, C. W. Keller, Cade Keller, Margaret Keller and Hae Keller.

Charleston, W. Va.—Olom Garage; capital stock, \$10,000; incorporators, F. H. Olom, Harlow Olom, J. H. McClinton, W. G. Mathews and George M. McClinton.

Cleveland, Ohio—Climbe Automobile Mfg. Co.; capital stock, \$100,000; incorporators, M. F. Moore, A. B. Brennan, G. D. Evert, Theodore V. Moore and M. H. Glare.

Cleveland, Ohio—Britton Carburetor Mfg. Co.; capital stock, \$50,000; incorporators, L. M. Diehl, A. C. Diehl, Paul C. Jones, Carlton F. Schmitz and Grant C. Middleton.

Cleveland, Ohio—West-Cleveland Motor & Supply Co.; capital stock, \$10,000; incorporators, Ralph T. Brown, John A. Kaden, Abraham J. Ullman, Marie D. Wagner and M. W. Bracken.

Cleveland, Ohio—Stanley Steamer Car Sales Co.; capital stock, \$10,000; incorporators, Lewis W. Thomas, Sophia Z. Thomas, Mildred E. Thomas, Roscoe M. Ewing and W. B. Bracken.

Cleveland, Ohio—Heckenbach Auto Livery Co.; capital stock, \$10,000; to operate a livery company; incorporators, John Heckenbach, P. Kuegerle, Lewis Drucker, B. C. Zieve and Arthur A. Neiger.

Cleveland, Ohio—Ingersoll Tire & Supply Co.; capital stock, \$10,000; to deal in tires and supplies; incorporators, Alan Ingersoll, W. A. Morgan, Carl P. McIntire, Louis H. Weggemann and Alex. L. Dreyfus.

Cincinnati, Ohio—Combined Auto & Accessory Co.; capital stock, \$15,000; incorporators, T. C. N. Vance, Frank Cain, E. H. McElroy, George W. Harding and Thos. L. Michie.

Dayton, Ohio—Maxter Auto-Truck Sales Co.; capital stock, \$10,000; to deal in trucks; incorporators, George H. Connelley, Herbert A. Ralls, J. L. Miller, William P. Jenkins and Erie J. Weaver.

Decatur, Ill.—Wheeler Automobile Garage Co.; capital stock, \$30,000; incorporators, Amos Wheeler, Nicholas Bommersbach and Claude Ping.

Grand Rapids, Mich.—Western Michigan Motor Co.; capital stock, \$10,000; incorporators, C. M. Crapo, A. A. Johnson, E. E. Johnson, Maurice Foreman and J. E. Crue.

Indianapolis, Ind.—Gordon-Little Co.; to deal in motor cars; capital stock, \$10,000; incorporators, C. C. Gordon, F. E. Little, F. W. Walters.

Kenosha, Wis.—Winther Securities Co.; capital stock, \$50,000; incorporators, M. P. Winther, William Martinson and W. M. Burke.

Kenosha, Wis.—Winther Motor Truck Co.; to manufacture and sell motor trucks, etc.; capital stock, \$300,000; incorporators, M. P. Winther, William Martinson and W. M. Burke.

Little Rock, Ark.—Little Rock Motor Car Co.; capital stock, \$10,000; incorporators, F. N. Fisher, D. M. Armstrong, Ellen B. Armstrong and A. Goodman.

Lockhart, Tex.—Shopsphere Auto Co.; capital stock, \$10,000; incorporators, E. E. Shopsphere, W. H. Swearingen and W. T. Patterson.

Louisville, Ky.—Main Street Garage; capital stock, \$5,000; incorporators, J. P. Marx, William Patterson and T. Hicks Myrth.

Louisville, Ky.—Thomas Garage; capital stock, \$25,000; incorporators, William A. Thomas, Vincent Thomas and Florence J. Gathier.

Bonniwell Resigns from Auburn—C. A. Bonniwell, for 2 years assistant sales and advertising manager of the Auburn Automobile Co., Auburn, Ind., has resigned, his resignation to take effect Feb. 1.

Gemmell With Pennsylvania—J. R. Gemmell, formerly sales manager for the Kansas City branch of the B. F. Goodrich Co., has been placed in charge of the Chicago branch of the Pennsylvania Rubber Co.

Parker Rust-Proof Factory at Flint—The Parker Rust-Proof Co., Detroit, will build a branch factory at Flint, Mich. The company plans to erect twenty-five branch plants in the leading metal cities of the United States.

Dauch Tractor Establishes Branch—The Dauch Tractor Mfg. Co., Sandusky, Ohio, has established a branch office and distribution point at Bloomington, Ill. Six salesmen will have their headquarters there and cover Illinois territory. C. L. Bragg, Chicago, is manager.

Miller Gets Nash Appointment—George P. Miller, secretary and treasurer of the Hokenson Automobile Co., Madison, Wis., has been appointed general agent of the Nash Motors Co., Kenosha, Wis., for the major part of the central section of the Mississippi valley. Mr. Miller will have charge of the distribution of Jeffery cars and Jeffery Quad trucks throughout the territory under the general direction of Alfred Reeke, general sales manager of the Nash company.

Sues for Patent Infringement—The Blackburn Specialty Co., Cleveland, Ohio, has brought suit against the Defender Autolock Co., Detroit, for alleged infringement of patents on key-operated electric and autolock switches owned by the plaintiff, and known as K-W Autolocks for Ford cars and Blaco Autolocks for other makes. The plaintiff alleges the K-W Ignition Co. is sole licensee of its patents for locking devices for Ford cars and no others are authorized to make and sell them under its patents.

Memphis, Tenn.—Southern Motor Car Co.; capital stock, \$50,000; incorporators, S. H. Butler, J. M. Constable, R. E. Keller, A. P. Galtner and W. E. Kysor.

Millwaukee, Wis.—Achen Motor Co.; capital stock, \$45,000; incorporators, F. W. B. Achen, Arthur Gardiner, Robert A. Gardiner and Hugo C. Boorse.

Millwaukee, Wis.—Diener-Nelson Co.; to deal in new and second-hand cars, etc.; capital stock, \$10,000; incorporators, Walter H. Diener, Clair V. Diener, John E. Diener and May B. Diener.

Nashville, Tenn.—Falcon Motor Car Co.; capital stock, \$150,000; incorporators, J. G. Hamblitt, O. A. McGill, E. E. Karlson, J. R. Manley and C. P. Kessler.

Plymouth, Wis.—Auto & Implement Co.; capital stock, \$25,000; incorporators, Hubert Mantheu, John DeMatt, Henry Tatel and Henry Termaat.

Rogers, Ark.—Apperson Motor Sales Co.; capital stock, \$15,000; incorporators, R. H. Whitlow, T. S. McNeil, F. E. Miller and J. M. McClelland.

Saginaw, Mich.—Saginaw Graphite Co.; capital stock, \$250,000; incorporators, William L. Reinker, Walter D. Eddy and Edward Ewen.

Saginaw, Mich.—Coleman-Frank Co.; capital stock, \$15,000; to deal in motor trucks, vehicles, accessories, machinery and supplies and to repair work; incorporators, David A. Coleman, I. Leonard Frank and Anne W. Coleman.

Sandusky, Ohio—Vulcan Drop Forge Co.; capital stock, \$350,000; incorporators, Gustav von den Kleim, C. M. Horn, Paul J. Bickel, I. L. Evans and J. B. Putnam.

Sheboygan, Wis.—Wilson's Auto Mart Co.; capital stock, \$15,000; incorporators, Gustave Hemlin, Albert Hemlin and Fred Miller.

Toledo, Ohio—Fending Auto Sales Co.; capital stock, \$25,000; incorporators, Odel D. Fending, Mary S. Fending, Joseph S. Fending, Stanley G. Fending and Charles Hartmann.

Toledo, Ohio—Gillespie-Curtin Co.; capital stock, \$10,000; to operate a garage; incorporators, Charles J. Gillespie, John G. Gillespie, Peter T. Curtin, Christopher J. Zaneck and William B. Duck.

Toledo, Ohio—Brankschott Auto Sales Co.; capital stock, \$10,000; to sell motor cars; incorporators, Harry A. Brankschott, Louis C. Sorenson, Charles W. Riley, Lester E. Dier and Leah M. Gayman.

Toledo, Ohio—Fender's Garage & Service Co.; capital stock, \$5,000; to repair, exchange, incorporate, John P. Carey, P. Martin Hoffman, Ernest R. C. Smith, Z. H. McPherson and George N. Felt.



MOTOR AGE

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ANNOUNCEMENT

The Chicago Show Number of Motor Age, which will bear the date of Jan. 25, will cover the accessory field and give a complete history of all Chicago shows. In addition there will be many feature stories that will portray the magnitude of the western metropolis as a distribution center for cars and parts.

We have ceased to boast about casings that go 8,000 or even 12,000 miles. Really, that is a commonplace performance for

Kelly-Springfield Tires

We blush for the occasional tire which fails to deliver to its owner the guaranteed mileage, but when that happens—which is seldom—we make the adjustment promptly and pleasantly.

Kelly-Springfield Tire Co.

Executive Offices
Broadway at 57th Street
New York

General Sales Department
1900 Euclid Avenue
Cleveland, O.















many of the drivers, both civilian employees of the quartermaster's department and enlisted men, are victims of the speed germ. They start out from Columbus or some other border town for a post located some distance away and try to break all existing records. As a result another truck will have to be sent out to pull the first one out and then mules have to be sent out to pull both trucks out, delivering the supplies.

REEKE BECOMES NASH DISTRIBUTOR

Detroit, Jan. 15—Al Reeke, general sales manager for the Nash Motors Co., will resign that position to become a distributor for the company. His successor has not been announced.

MASTEN OAKLAND SALES MANAGER

New York, Jan. 15—W. H. Masten has succeeded Charles B. Voorhis as sales manager of the Oakland Motor Car Co. of Michigan, Pontiac. This announcement was made by F. W. Warner, president and general manager of the company, at a dinner given by him to Mr. Masten, Mr. Voorhis and a number of Oakland officials and distributors at the Hotel Manhattan, Jan. 11.

ADVERTISERS MAY INVESTIGATE

New York, Jan. 13—The project of having the headquarters office of the Association of National Advertisers investigate motor trade publications was discussed at a meeting of the car and accessories division of the society held at the New York Advertising Club Jan. 10. Reports on the value of various advertising methods were presented.

U. S. RUBBER FLOATS BONDS

New York, Jan. 13—Plans covering the purchase of \$60,000,000, first and refunding mortgage, 5 per cent bonds of the United States Rubber Co., to cover all existing bonds and liens on the property of the company have been consummated. Kuhn, Loeb & Co. have begun the formation of a syndicate to underwrite the issue and will be associated with the American International Corp. Part of the proceeds from the sale of the bonds will be used to retire outstanding obligations of the parent company and its subsidiaries, amounting to \$24,697,148. All existing obligations will be paid on or before Dec. 1, 1918, except \$2,600,000, 6 per cent gold bonds of the Canadian Consolidated Rubber Co., maturing in 1946, and \$9,000,000 debentures of the General Rubber Co., due Dec. 1, 1918. The latter will be left undisturbed for the present as plans are under consideration for dealing with the company's crude rubber interests in another way. Last year's sales of the company and its branches approximated \$125,000,000 and the net earnings for 1916 are estimated at \$12,500,000, both of these figures being new high records.

Milwaukee Show Attracts

Attendance Is Nearly 70 Per Cent Greater Than That of Last Year—Total 70,259

Demand for Space Increasing So That Problem Is Presented

MILWAUKEE, Wis., Jan. 12—The official attendance at the ninth annual Milwaukee motor show, which was held in the Auditorium from Jan. 5 to 11, inclusive, was 70,259, compared with 41,440 in 1916, a gain of 28,819, or nearly 70 per cent. Paid admissions also increased to a remarkable extent and were nearly one-half of the total attendance.

The tenth annual show will be held somewhat later in January, 1918, than this year, to avoid conflict with the New York exposition. In past years the Milwaukee show dates have come immediately following New York, but this year Milwaukee opened on the day before the Grand Central Palace affair. Thus it is believed that the usual attendance of big men in the industry at the Milwaukee show was cut down by the conflict. While all of the factories, as usual, sent special show cars and cut-out chassis to this city, it is likely that more of these jobs would have come had this show followed New York.

All exhibitors declare the show to have been unusually successful in all ways. The great demand for exhibit space made it necessary to crowd passenger cars into the basement, regarded as the exclusive property of motor truck exhibitors. Practically the final limit of elasticity of the big auditorium was reached this year and a problem of accommodating the overflow at future shows if space demands continue to

grow as in the last few years, now has become a serious one.

But little inconvenience was noted from the acute congestion of railroad traffic. It is known that the railroads issued orders some time ago that show cars and chassis practically must be considered perishable goods and be given the right of way.

The largest truck exhibited at the show was a 7-ton Stegeman, with worm drive, which featured the display of the Stegeman Motor Truck Co., Milwaukee. The car, complete with body, as exhibited, weighed 13,122 lb. The rear tires had a combined width of 32 in.

From information gathered at the show, Wisconsin distributors expect to place an aggregate of 38,500 to 40,000 cars in the Badger state for 1917. During 1916, this state absorbed 35,800 cars, an increase of 44 per cent over 1915. The total number registered by private owners was 115,650. The number sold in Wisconsin last year was more than all of the cars in use in this state in 1913, which was 34,646.

It is estimated that 75 per cent of the total number of 1970 dealers in Wisconsin attended the show. This year the Milwaukee Automobile Dealers, Inc., which manages the show, dispensed with the annual banquet in honor of state dealers because no suitable banquet hall could be found to accommodate the large crowd, and also because practically every factory and distributor entertained its dealers at banquets during show week.

MULFORD LEAVES HUDSON

New York, Jan. 16—Special telegram—Ralph Mulford has left Hudson to join a Cleveland car company with which he is at present negotiating.

BROADEN RECEIVERS' AUTHORITY

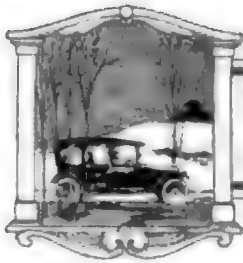
York, Pa., Jan. 12—Judge Charles B. Witmer in the United States district court at Williamsport yesterday appointed William A. Keyworth, Carlton L. Hoff and Henry D. Schmidt, all of York, Pa., receivers for the Pullman Motor Car Co., of York. The same men were recently appointed receivers of the company by Judge Nevin M. Wanner, in York, but that action only covered the assets of the company in York county, whereas the receivership resulting from yesterday's action protects the assets in all parts of the United States. The company has assets in twenty-six states. All the company's real estate and manufacturing property are located in York.

The extension of the receivership results from a suit presented in the United States court by Michael S. Niles, solicitor, in which the Ryland & Brooks Lumber Co., Baltimore, Md.; the Dupont Fabrikoid Co., Wilmington, Del.; and G. Laton Grier, of Delaware, and N. B. Marple, Columbus, O., are plaintiffs. The receivers are authorized to borrow not more than \$120,000 for the conduct of the company's business.

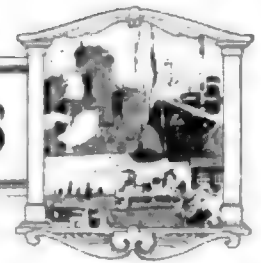
Ford Makes Big Purchase

Material for Million Cars Said to Have Been Bought from U. S. Steel

CHICAGO, Jan. 16—It is understood on high authority that the Ford Motor Co. yesterday bought direct from the United States Steel Corp., material for one million cars for this year's production, 250,000 more than the 1916 figure. Although the schedule of deliveries will not be completed until later in the week, it is understood that deliveries on the order will begin immediately. This includes stock for every metal portion of the car except some parts of the motor, and will be delivered in the form of sheet rod and bar stock. As no additional proportion of copper wire or magnet stock is ordered, it is taken for granted that Ford does not at this time expect to incorporate electric starting as part of the new production.



EDITORIAL PERSPECTIVES



The Brimming Pocketbook

PROSPERITY, that new abstract institution which is creeping into every corner of the United States, is setting up a pronounced reflex action in the concerns most recently created for motor car manufacture. This reflex action is exemplified in the return of builders to cars of extreme high price.

THE Chicago show will exhibit to the public for the first time a chassis alone costing \$9,500. It will exhibit a good round number of new cars, built by new companies, which list around \$3,000 to \$5,000. It will exhibit the last notch in the coach builder's art in new and wonderful bodies applied to stock chassis of old established car builders.

TWO years ago—a year ago, cars in the \$5,000 class were few and far between. Now there are a score and more of them. Moreover the high-priced ones are not all inclosed bodies, in fact,

the proportionate price of high class closed cars and high class open cars, as far as the number of models is concerned is about maintaining an equilibrium.

IT is the demand for individuality and real art in body designing and finish that is stepping the price up, and where there is a public cry for an expensive article it does not take long for manufacturers to create articles which will appease that particular demand.

THERE is no good reason why the demand for high-priced and special-built cars should not be maintained. It was the prophecy several years ago that the industry would eventually revert almost entirely to the production of cars around the \$500 class. The new demand blasts that prophecy. Now the tendency seems to be toward ever-increasing price.

Safety at Crossing

MOTORISTS who cross railroad grade crossings, without heeding the warning to "Stop, Look and Listen," then if reasonably sure no train is about to pass, cross the track without shifting to low gear and with an abundant supply of gasoline vapor feeding the engine—are making a death trap for themselves and for others in the car. How much time is lost in taking the precaution to "Stop, Look and Listen"? A fraction of a minute.

WITH the motor working in low gear and a good supply of gasoline feeding the cylinders, there is no chance inadvertently to kill the engine or stop the car on the track. Many railroad crossings are much above the elevation of the highways and the running slowly in high gear to ease over the bumps together with the

added pull of the grade puts an unusual load on the engine at nearly closed throttle, and the result is a dead engine. This trouble can be overcome as suggested: low gear and plenty of gas feed.

THE slogan to be used by every motorist in crossing a railroad track at grade should be "Take No Chances." It is bad enough to risk your own life. It is nothing less than a crime to jeopardize the lives of others in your car. Railroads are taking every precaution to prevent grade-crossing accidents. Why is it that men of strong minds and intelligence in other walks of life will deliberately flirt with death when driving a motor car over railroad crossings?

Startling the Natives

THOSE who visited the motor car exhibition in New York and those who read representative accounts of the exhibition cannot fail to be impressed with the absence of startling features. In other years we have had such new developments as the eight-cylinder engine one year, the twelve-cylinder another, and so on. This year there is nothing really novel offered by representative manufacturers. Of course, the introduction of the sixteen-valve motor as a part of the stock production program of three manufacturers may be considered a development, although we have had the sixteen-valve, four-cylinder motor in racing for years. It is more probably an example of the incorporation of the lessons learned in racing as a part of stock production.

PERHAPS, at first glance, this lack of high lights may be considered an evidence of lack of progress. Such is not the case, however. It means on the other hand that with the major portion of the design a matter of settled policy for the time being, at least, the manufacturers have found it possible to turn their attention more completely to the refinements of manufacture and practicalities of construction instead of finding it necessary to devote a major portion of their energies to the development and exploitation of designs or systems hitherto foreign to their production program.

THE industry now is on a big-production basis which must of necessity check the introduction of anything radical in the way of design or construction. For the large manufacturer to change his product in some important feature will necessitate excessive production costs. Consequently large production manufacturers must be certain that any change will result in great advantages before it is made. This is the reason that we must look to the small manufacturer in general for any sweeping alterations or radical deviations from previous design. The manufacturers who are making their first appearance before the public are the most likely to have something out of the ordinary to offer the buying public.

THE fact that there is considerable uniformity among the large manufacturers as to design and also that there is little radical introduced may be taken to mean that for a time, at least, the period of experimentation insofar as it is to be tried out on the ultimate consumer, is over. The fact that the manufacturer is not offering anything new mechanically does not mean that the experimental and design departments of the factory are idle. Every factory of any prominence maintains an advance line of skirmishers in the fields of research, but they are slower than ever before in offering their findings for public consumption.

Vanderbilt to Come East

Effort Being Made to Transfer Classic Back to Long Island Road Course

Co-operation Looked for in Accomplishing Proposed Change

NEW YORK, Jan. 16—Special telegram—The Vanderbilt cup race may be given back to the East. A committee has been appointed to consider ways and means of bringing this about and if it can be satisfactorily arranged, the race may again be run over a Long Island course. The matter first came up for discussion at a luncheon tendered to Dr. H. M. Rowe, president of the American Automobile Association, by Robert Lee Morrell, president of the metropolitan consulate of the A. A. A. Later a committee was appointed to consider the possibility of bringing the race East and to make individual investigations concerning conditions which have made it necessary that the race be held on the Pacific coast.

The committee consists of Robert Lee Morrell, Jefferson Demont Thompson and William Schimpf, all ex-chairmen of the contest board, Richard Kennerdell, present chairman, Frank G. Webb and Robert Graves. To date little progress has been made though it is confidently expected that with the active co-operation of dealers and factories something of a definite nature may be done in the near future. The committee is to meet again in the course of a week or ten days.

MOVIES SELL MOTOR CARS

New York, Jan. 15—Motion pictures as a means of advertising is rapidly assuming major proportions in the motor car industry. In the three years that this class of film has been produced, more than 90,000,000 feet have been flashed on the screens of 25,000 theaters scattered over the United States and to-day over 10 per cent of the output of this film is sold direct to motor car dealers, garagemen, repairmen and accessory dealers. The tire and accessory dealers are the largest consumers and the garagemen next. The animated cartoon film is by far the most popular. These average from 20 to 50 feet in length and cost about \$7.

ROAD EXPENDITURES INCREASE

Washington, D. C., Jan. 15—Expenditures for road improvements in the New England states in the last decade range from 10 per cent in Rhode Island to nearly 205 per cent in Massachusetts according to statistics for that section just published by the office of public roads and rural engineering of the department of agriculture.

The surfaced roads of the six states have an aggregate mileage of 18,036 miles which is 20.8 per cent of the total road mileage. The report showed that 10 per cent of the improved roads in New England are bituminous and macadam, 12 per cent macadam, 23 per cent concrete and .01 per cent brick. Approximately 60 per cent of the improved highway is surfaced with gravel and of the six states, Massachusetts has 45.53 per cent of the total surfaced roads.

U. S. NEEDS NO LICENSES

Washington, D. C., Jan. 16—Special telegram—Comptroller of the Treasury, Walter W. Warwick, has ruled that the Federal Government has the right to operate motor cars anywhere in the country without obtaining licenses for its chauffeurs and without buying licenses for the cars. This will be particularly broad in effect, since the truck is becoming so nearly universal in use for the mail service.

PENNSYLVANIA TAGS REJECTED

York, Pa., Jan. 13—With the state highway department insisting that the license tags furnished by the prison labor commission are below standard in construction and rejecting the first shipment of 8,000, applications for tags that cannot be filled are piling up with the probability that within a week the state may be 25,000 tags behind the demand. Private interests that have hitherto been interested in tag contracts from the time the prison labor commission got the contract, have been active in their endeavors to discredit the plan of turning out the tags with convict labor. The prison labor commission is supplying the tags for 20 cents per set, or about one-half the price asked by the private contractors.

ILLUSTRATION OF OLDSMOBILE

In the MOTOR AGE issue of Dec. 28, the article descriptive of the Oldsmobile eight for 1917 contained an illustration of the four passenger club roadster which was incorrectly captioned as a seven-passenger car.

AERONAUTIC EXPOSITION FEB. 8-15

New York, Jan. 15—United States government will have a comprehensive exhibit at the first Pan-American Aeronautic Expedition to be held in the Grand Central Palace, Feb. 8 to 15. Among the departments to be represented is the War Department, the aviation section of the army, the U. S. navy, Bureau of Standards, the Weather Bureau and the U. S. Geodetic survey. In the government exhibits will be shown various methods now employed on the European war fronts for intercommunication of aircraft. The navy department will show various instruments required for hydro-aeroplane navigation by naval flyers of this kind.

Fiats to Race This Year

Two Italian-Made Cars Will Be Piloted Over Hoosier Course Memorial Day

Details Not Available but High Speed Is Expected

PARIS, Jan. 14—Special cable—The decision of the Fiat Co. of Turin, Italy, to enter two Fiat racing cars at the Indianapolis speedway Decoration Day, May 30, may be taken as conclusive evidence that the European countries have not lost interest in the motor industry of America and that they are anxious to maintain their former prestige in this country. That Fiat has been developing new racing cars has been known for some time. These have been under test for the last year, and they have been given severe treatment during that time, as the Fiat pursues a uniform policy of severe testing. Opinion here is that other concerns are much interested in the American speedway racing circuit but that war conditions have made it impossible for them to build special cars. The details of the new Fiats are not yet available.

DISBROW HAS NEW CARS

New York, Jan. 13—Louis Disbrow is making a display in this city of two new racing cars built by him and which he will use on the tracks this year. Two T-head Wisconsin motors of 60 and 90 hp., respectively, are used.

HEARN IS REINSTATED

New York, Jan. 16—Eddie Hearn was reinstated by the contest board of the American Automobile Association at its meeting last Wednesday. His reinstatement becomes effective July 12 providing he does not compete in any outlaw races up to that time. Hearn will drive two cars this year.

HOME FACTORY TAKES U. S. FIAT

Paris, France, Jan. 14—Special cable—The Fiat Co., Poughkeepsie, N. Y., has been taken over by the home factory of the Fiat Co., Turin, Italy, according to information obtained in Italy a few days ago. The details of the deal are not disclosed but it is understood that some of the heaviest stockholders in the U. S. A. Fiat factory retain their interest. J. S. Josephs, treasurer, retains his interest.

CONTINENTAL SERVICE STATIONS

Detroit, Jan. 15—The Continental Motors Co. will open a number of national service stations throughout the United States. Contracts have been closed in both New York and California for the first of these stations. The identity of the parties concerned has not yet been made public.





And We Talk Economy!

\$1 Worth of Fuel Gives 10c Worth of Power in Our Engines

Men Who Delve Into Vitals of Car Discuss Their Findings in Annual Convention—Engineers Elect Durham President and Adopt New Standards of Motor Car Parts Sizes

NEW YORK, Jan. 12—The broadened scope of the motor car industry and its inter-relation with other forms of power transportation was brought out forcibly during the national exhibition in New York this week. One of the major associations of the industry, the Society of Automobile Engineers, whose annual winter meetings are one of the features of the week in New York, brought its general convention to a close yesterday. This is the last meeting of the Society of Automobile Engineers that ever will be held, for by the time of the next session in mid-summer, it will be a new and broadened association with a new and broader name.

In compliance with the request of the Army and Navy departments of the Government, the motor car engineers have allied themselves with those of the aircraft, the tractor, and the motor marine fields, and the name will be changed to the Society of Automotive Engineers, whose field of endeavor is as broad as the art of self-propelled transportation through the air, on the water and on land. It only remains for the almost certain confirmation of a mail vote to put this into effect.

S. A. E. Day

Yesterday was S. A. E. day, and starting with the business meeting in the morning, a special session in the afternoon and ending with a banquet and entertainment in the evening, the whole day was devoted to the engineers and their friends.

George W. Dunham, consulting engineer was elected as president, to succeed Russell Huff, chief engineer of Dodge Bros.; Jesse G. Vincent, vice-president of the Packard company, was made first vice-president; Charles M. Manly, vice-president of the Manly Drive Co., becomes second vice-president; Herbert Chase, assistant manager of the Society is treasurer. New members of the council are: B. B. Bachmann, engineer of the Autocar Co., H. L. Horning, engineer and general manager of the Waukesha Motor Co.; C. W. McKinley, engineer of the Willys-Overland Co., and F. E. Moakovics, commercial manager of the Nordyke & Marmon Co. It is stated



George W. Dunham, new president Society of Automotive Engineers

that Horning received the greatest vote ever recorded for a member of the council.

After the close of the professional and business sessions the annual banquet was held at the Biltmore and the social activities culminated in an S. A. E. frolic at Ziegfeld's Follies at midnight.

In opening the professional and business meetings, President Huff spoke of the successful year which the society has just passed through and on the bright outlook for the future, particularly since the merging of the other automotive societies had been practically consummated. Members of the other organizations are to be permitted to enter the S. A. E. at any time after the date of ratification for a period of 3

months, without the payment of initiation fees.

Another great feature of the society's work as mentioned by Mr. Huff is the increased co-operation with the government. This is a phase of the work which has been growing rapidly and presages a closer connection between the endeavors of the society and those of governmental activities in similar directions. The particular work in which members of the society are assisting the government are the drawing up of standard truck specifications and on the aeronautical division of the standards committee. The society is also in close touch with the bureau of standards in Washington.

President Huff spoke of the increase in membership of the society which now has passed the 2000 mark. In January, 1916, there were 1783 members. The total for January, 1917, is 2120, without counting thirty-five additional applications which have just been accepted.

Standards Committee Business

Growth of the standards work is worthy of comment. It had its inception in 1910 and at that time a number of the members of the S. A. E. contributed out of their own pockets to guarantee the work. In 1916 the budget allowed \$7,500 for standards work and the actual cost was \$10,000 and in 1917 it is likely that the expenditures along this line will exceed \$14,000. The financial condition of the society is indicated from the fact that there is a total surplus on hand of \$30,490.

Some of the other business to come before the society at the business meeting which followed President Huff's address concerned constitutional amendments. The matter of the change of name, revision of the council to take in the aeronautic and tractor fields, succession of officers and a constitutional revision committee, were passed along for further consideration.

The divisions which presented reports were those dealing with aeronautic engines, electrical equipment, electric vehicles, engines and transmissions, iron and steel, miscellaneous parts and fittings, springs, tires and rims and trucks. Little

discussion developed on any of the reports except that on the tires and rims. The tire and rims division has had under consideration for the last few years a set of standard loads for solid truck tires. It has been of considerable difficulty to reconcile the different tire manufacturers to these loads and the table arrived at in the report was turned over to the truck standards division for review.

A little discussion developed on the report of the aeronautical engine division on the recommendation of the tapered shaft fitting for propellers. The report covered this feature and spark plugs. There also was a notation on direction of engine rotation.

This year the S. A. E. is trying the experiment of compressing meetings during show week into one day. The morning of Jan. 11 was given over to business and the afternoon to the discussion of papers. The papers are as follows:

Some Problems of Aeroplane Construction—Capt. V. E. Clark, U. S. A., Capt. T. F. Dodd and O. E. Strahlmann.

The Ultimate Type of Tractor Engine—H. L. Horning.

Dynamic Balancing of Rotating Parts—F. Hymans.

Remarks on Dynamics of the Automobile—N. W. Akimoff.

Some Essential Features of High Speed Engines—A. P. Milbreath.

Heat-Balance Tests of Automobile Engines—Prof. Walter T. Fishleigh and Walter E. Lay.

Aerial Navigation Over Water—Elmer A. Sperry.

Two Aeronautic Papers

The first paper is a very concise statement of the requirements of the army with respect to aeroplanes. It contains a great deal of valuable data. The authors do not hesitate to criticize the practice of the day, and their paper should be of very great value to any manufacturer about to embark upon the construction, either of aeroplanes or of aviation engines. The other aerial paper is devoted very largely to considering the advantages of the gyroscopic compass.

The paper on Dynamic Balancing of Rotating Parts by F. Hymans, is a lucid and an accurate explanation of the main problems of balance and includes descriptions of several types of balancing machine. The author contends that the Akimoff, which is the most recent balancing machine, has advantages not possessed by any other, principally because a test on the Akimoff machine gives more complete information regarding the condition of unbalance of the body on which a test is being conducted.

A most interesting feature of the Akimoff machine is that a body to be balanced can be tested actually mounted as it will finally be. That is to say, the balance of a crankshaft can be obtained while it runs in its own bearings in the crankcase.

Where Power Losses Go

Thermal Efficiency Subject of Fishleigh Paper

Horning Talks Tractor Engines and Akimoff, Suspension

THAT \$1 worth of gasoline gives 10 cents' worth of power, the engine and its accessories absorbing the other 90 cents' worth.

That water abstracts 40 per cent of the heat value of fuel burned, exhaust gas carries away 25 per cent more, and air in contact with the engine carries away 25 per cent more, leaving only 10 per cent of heat value of fuel as brake horsepower.

These are the rough average conclusions given by Professor Fishleigh's paper on a series of tests made to determine the "heat balance" in a six-cylinder engine. Of course, the low thermal efficiency of a motor car engine has always been well known, but the author's tests give much detailed information of value. They show the effect of speed and of throttle opening. The extracts following include the main points of the paper, but there is much additional matter, including complete accounts of each test run.

The fuel consumption per brake horsepower per hour at any speed was marked high at low horsepower output, and decreased steadily as maximum output at any speed was approached. Thermal efficiency correspondingly increased at any speed as the output increased. Under maximum output conditions, the infrequent and unimportant automobile-operating range, fuel consumption is relatively low and thermal efficiency relatively high. For a given brake horsepower developed, the fuel consumed per brake horsepower per hour increases at increased speed, the consumption for 20 hp., for example, being 0.87 lb. per b.hp. per hour at 640 r.p.m., 0.93 lb. at 1000 r.p.m. and 1.05 lb. at 1350 r.p.m.

Mechanical efficiency at any speed improves with increased load. For a given load, mechanical efficiency is better at low speeds, the figure for 20 hp. being 85 per cent at 640 r.p.m., 72 at 1000 r.p.m. and 62 at 1350 r.p.m.

The tests covered by this paper were conducted by advance students in automobile engineering, and in preparation and conduct extended over 10 months. Great care was exercised in set-up and procedure and no pains spared in an effort to get reliable and authoritative data. The engine used was of the six-cylinder, L-head type, with 4¼ by 5¼-in. cylinders cast in triplets, recirculating splash lubrication, and forced water cooling.

Runs were made at 640, 1000 and 1350 r.p.m., which represent average operating speeds of the engine, and which for one of the prominent makes of cars in which this particular engine is used, correspond to car road-speeds of about 18, 28 and 39 m.p.h. At each speed, runs were made with the engine developing various horsepowers, which cover the normal operating range. For example, at an engine speed of 640 r.p.m. corresponding to a car speed of 18 m.p.h., runs were made developing 5, 10, 15 and 20 hp. The maximum output at this speed was about 25 hp.

Estimates for the horsepower required to overcome road and air resistance under favorable conditions for the car in question gave 5 at 18 m.p.h., 9.5 at 28 m.p.h. and 17 at 39

m.p.h. A fair estimate of the efficiency of power transmission through the gear box, differential, rear axle and tires including slippage would give 80 per cent at 39 m.p.h., 75 per cent at 28 m.p.h. and 70 per cent at 18 m.p.h. Upon this basis it is clear that, in order to propel the car under average favorable conditions on the road, the engine would have to develop 6.25 hp. at 18 m.p.h., 12.7 hp. at 28 m.p.h. and 24.8 hp. at 39 m.p.h.

Horning on Tractor Engines

H. L. Horning, engineer of the Waukesha Motor Co., who was down on the program for a paper entitled the Ultimate Type of Tractor Engine, did not read his paper, but instead, delivered a rather illuminating address of the subject.

Mr. Horning said that nothing since the discovery that a hook on the end of a pole would aid in the art of agriculture, had promised to benefit man to such an extent. It will be a factor in reducing the high cost of living. The value of land may be appreciated when it is mentioned that it takes 4 acres to keep a horse alive for a year. The tractor is a work horse and not a race horse and unlike the aero engine which may be overhauled every 120 hr. the tractor engine must keep on indefinitely in spite of abuse.

The tractor must have the ability to keep on going. And it must keep on going under difficulties that are enormous. Take the matter of oiling, which is so important. Yet instead of getting the proper oil the tractor is apt to get the product of mail order houses which is anything but correct. In one case it was found that a farmer had been using linseed oil in his engine. The use of kerosene also reduces the viscosity of the oil with the result that the rings in the top groove wear three times as rapidly as those in the lower ones. Mr. Horning said he had seen rings wear out in 2 days while working at 108 deg. in the shade in a Kansas dust cloud.

In securing efficiency the speed of the engine and the attainment of higher mean effective pressure are the cardinal points. The design of the combustion chamber must be watched and numerous pockets and solid parts to cool must be avoided.

What the tractor engine has to work against may be seen when the farmers' method of regulating speed is known. He will sink his plough and if it is too deep, cutting the speed of the tractor down too far, he will lift it a little so that the desired speed is attained. In other words the engine is working constantly at maximum torque speed. In every way this is the most difficult work that can be put on this type of engine as it represents constant wide open throttle work or what would be parallel in automobile practice to a car that is climbing a grade constantly at the highest possible speed that it can be made to negotiate the hill.

The cooling of the spark plug must be carefully watched and the waterjackets arranged so that a vertical flow of heat will be maintained down the valve stem. Eighty per cent of the troubles are around the exhaust port and the flow of heat on the valve is down the stem from the center of the valve head. The matter of the valve seat is a compromise. If the seat is too narrow the valve will not cool and if it is too wide carbon will form on account of the excessive cooling.

In speaking of the results accomplished in the laboratory Mr. Horning said that he had been able to secure with tractor engines a performance equal in car practice to 42,000 miles of travel at 45 miles per hour up the steepest hill that the car could climb at that speed.

(Concluded on page 20)



the little adobe hut, now crumbling into decay, which formerly afforded shelter at Stovepipe Wells. All that remains of the Wells is a dugout in the sand, about 8 ft. long, 4 ft. wide and 4 ft. deep. At the bottom of the excavation is a green scum indicative of moisture, which if shoveled would yield about a pint of water; enough to mean the saving of a human life.

Following inspection of the dugout, an additional 10 lbs. of air was pumped into the tires and the climb up the Talus grade to the mouth of Boundary canyon commenced. It was more of a strain than shooting the giant dunes. Frequently the rear wheels dug holes in the sand and the machine would slide back 1 ft. for every 2 ft. gained. The climb is 2 miles with a

grade of 12 to 16 per cent and it is quite likely that an accident in between the 400-lb. boulders that dot the road would have left the fate of the party in doubt for all time.

Cross Valley in 8½ Hours

The summit of Boundary canyon was attained. It was, then, but a short journey to Daylight Springs, where the car arrived at 11 a. m., making the trip across the floor of Death Valley, a distance of 14 miles, in 8½ hrs., including the time for taking the photograph in the center of the desert.

The elevation of 4337 ft. at Daylight Springs produced a delightful coolness compared with the burning heat rays of the valley and each member took turns at a bucket bath, and retired in the shade

of the car for a rest of a few hours. The remainder of the journey to Rhyolite was accomplished without difficulty.

Thus the expedition ended. H. A. Arnold, Dodge dealer in Los Angeles, who wanted to know the durability of his car in rough, untraveled country, and who planned and authorized the journey, learned just what the machine will stand. Mr. Parker, who has traveled all of the unfrequented regions of the Southwest and calls the Death Valley trip the most desperate in his experience, has learned all about the desert. In all, it was a most exciting and interesting excursion, but it is a most unpleasant speculation to think of the consequences of a tire blow-out or a loosened cotter pin while the car was working its way across the sand waves.

Where Power Losses Go

(Concluded from page 17)

Some rather unusual statements were made by N. W. Akimoff in his paper on the Dynamics of the Automobile. These in part seem to be contradictory to general belief.

The plunging period, aside from giving an idea as to its relation to the pitching period, is of no special interest. But the formula for pitching period suggests:

The weight proper of the car does not enter directly and is only implied by the initial static deflection of the springs. This deflection, however, is quite as characteristic of the springs as it is of the weight.

The distribution of the weight appears to be of importance, as is evidenced by the radius of gyration k , to which the period is directly proportional. In other words, to secure easy riding—slow period of pitching—the loads should be placed as far as possible from the center of the car. The mere fact that they give the same deflection does not in itself preclude the possibility of entirely different effects due to load distribution.

The wheelbase should be kept as short as possible, because the period is inversely proportional to its length. This, of course, does not mean that it should be reduced to ridiculous proportions; the practical requirements of safety, static stability and appearance will at once fix limits in this respect; but these will be lower limits, for each type of car. It can likewise be shown that the linear up-and-down acceleration of the extreme points of the car, such as the rear seat, is practically proportional to the third power of the wheelbase; hence another reason why this dimension should be kept short.

If a car with a large wheelbase rides easily, this is not due to the wheelbase itself, but to the fact that its larger value means a larger car, in general, a larger body and possibly a greater radius of gyration. It is possible to imagine a case in which the wheelbase has been increased and the weight distribution and the radius of gyration, in fact the whole body, has been left unchanged. Such a car, other things being equal, will not ride so well.

As regards the cantilever-spring arrangement, in favor of and against which so many subjective opinions have been advanced, the true explanation seems to be easy enough. Assuming that we have two identical cars, the wheelbase, initial—static—spring deflection and everything else being the same, one provided with cantilever springs and the other, say, with full-elliptic springs. If the cantilever arrangement gives better riding qual-

ties, the reason lies in the fact that the spring is fastened more closely to the center of the body, thus giving the same effect as would a reduced wheelbase, that is, a slower period of pitching.

High-Speed Engine Design

Essential features of high-speed engines were discussed by A. F. Milbreath, secretary and engineer of the Wisconsin Motor Mfg. Co., which built the Stutz engine.

In high speed engines it is, of course, necessary to reduce reciprocating weights to a minimum; from this viewpoint, a small diameter of cylinder with a long stroke is favorable since the weight of a piston increases with some power of the diameter between the second and third, and the inertia forces of the piston vary likewise as long as the piston speed is constant.

On the other hand, however, the weight of the engine will increase with a longer stroke; crankcase diameter increasing with the stroke while the height of the cylinder increases with the length of the connecting-rod, which is about twice that of the stroke. Further, the valve area will decrease with a smaller bore unless large valve pockets are used. In Europe stroke-bore ratios as high as 2 have been used successfully. From the author's experience, ratios of 1.70 or 1.75 have given good results in 300-cu. in. engines.

Engine speeds will depend principally on the valve area and timing, size and form of inlet manifold, location of spark plugs, and on the resistance offered by the carburetor to the incoming charge. Valve location will also affect engine speeds to some extent.

The valve area should be as large as possible, but it will be limited, of course, by the size of the combustion chamber. The largest valve area can undoubtedly be obtained by using two intake and two exhaust valves per cylinder, placed on an angle of about 20 to 30 deg. from the vertical. With this construction, four valves 1½ in. diameter of 1¼ in. clear can be incorporated in a 3¼-in. cylinder without resorting to pockets. This will give ample capacity to develop a maximum horsepower at 3000 r.p.m. On a 300-cu. in. engine this would give an actual gas velocity of about 200 ft. per sec. through the valves when using a valve lift of ¼ in.

The inlet manifold should be of a size to give a gas velocity of about 175 ft. per sec. The manifold as well as gas passages in the cylinder must be smooth and as free from sharp bends as possible. With some carburetors an

extra air inlet in the manifold above the carburetor will increase the power at high speeds, but with most modern carburetors built for this service the air passages are free enough so that the air inlet in the manifold is not necessary.

The volume of compression space for the high speed of engine should be about 18 to 20 per cent of the total volume. This will give compression pressure of about 90 to 110 lbs. per sq. in. gage. The combustion chamber should be free from pockets. The more nearly spherical the shape the better it is for rapid flame propagation and gas flow, and also for reduction of heat loss to jacket water.

Valves must be made of the best material procurable. Tungsten steel serves admirably. The heads can be extremely thin, increasing from ¼ in. at the outer edge gradually toward the center with ample fillets at the stem. The valves should be of as light weight as possible, as even then great spring pressures are necessary to close them quickly, and make the valve lifters follow the cams. The diameter has already been discussed, and should be of such size as to give gas velocities of not over 200 ft. per sec. The lift of valves can be as high as one-quarter of the diameter, but for extremely high speeds it is well to keep the lift as small as possible, thus reducing the inertia forces in the valve and the stresses in the springs. Springs must be carefully designed and made of best materials or failure will result.

It is often deemed advisable to use double springs, an outer or main spring, and an inner or auxiliary spring. The stresses in the inner spring are kept lower than in the main spring so that the factor of safety will be large. With the double-spring construction the valve will not fall into the cylinder should a main spring break.

The acceleration of the valve can be ascertained most easily by a graphical method, as usually with the customary shapes of cams, the acceleration is not uniform. When the acceleration is known and the weights of the valve, cam-follower spring-seat and one-half that of spring are known the necessary spring pressure to close the valve in the given time can be calculated by the formula $P = W/a + g$, in which P = spring pressure, W = weight of valve and parts just enumerated, a = acceleration in feet per second, and g = acceleration due to gravity.

In actual practice at engine speeds of 3000 r.p.m. spring tensions of 80 lb. with valve seated, have been satisfactory on 1¼-in. valves weighing with accompanying reciprocating parts 0.9 lbs.

New York Show Aftermath Briefly Told

(Continued from page 14)

president, has a new type of motor ready for production, the first of which will be exhibited at the Chicago show.

...

The most unusual of the exhibits at the Palace was one which arrived after the show had opened, and which was the object of much interest on account of its freakish design. This was the Ingram-Hatch car, in which was combined an air-cooled engine operating on kerosene with double-friction drive, low differential, spring wheels with sectional tires made out of a vegetable compound in leather casings. No spark plugs are used, these being replaced by what are called thermo-igniters, being an electric adaptation of the original hot tube system of ignition, the tube being heated electrically. There is only one set of valves, these actuating both ports, and being operated by overhead cams. The car, as exhibited, was very crude.

...

The Champion Spark Plug Co., Toledo, in addition to the exhibit at the Palace, had a special exhibit at the Hotel Astor.

...

Premier and Harroun cars arranged at the show for distribution along the Pacific Coast. J. W. Leavitt & Co., San Francisco, is to handle both lines, the Harroun territory covering California, Nevada and Arizona, the Premier territory given Leavitt embraces the lower half of California and practically all of Nevada. The Leach Motor Car Co., Los Angeles, will handle the other half of the state and practically all of Arizona for the Premier.

...

Sales of cars at this year's Automobile Salon show an increase of 100 per cent over one year ago. From the opening on Jan. 2 up to Tuesday night sales amounted to \$400,000 and were expected to pass the \$500,000 mark when the final returns were completed.

...

With the appointment of Eugene Elliott, formerly Production Manager for the Haynes Automobile Co., Kokomo, Ind., as Eastern sales manager of the Smith-Form-A-Truck Co., and A. F. Johnston, formerly sales manager of the Automatic Carburetor Co., as Western sales manager, comes the announcement of the new sales plans of the Smith company. The territory is divided into major blocks under different managers and sub-divided into territories under from four to eight factory representatives and service managers. The Eastern territory covering that east of the Mississippi is divided into twenty-four major divisions.

Although no trucks are admitted to the exhibits at the Grand Central Palace, truck exhibits are to be found all over the city. Four years ago it was decided that motor truck shows did not pay and so they were discontinued. Nevertheless a number of motor truck manufacturers and makers of converters for Fords and other light passenger cars have rented expensive quarters in the hotels and in vacant stores throughout up-town New York for the exhibition of their chassis.

...

In the show proper a number of exhibits, such as the Smith Form-A-Truck Co., are to be found, these being considered as accessories, although the complete vehicle with body and all is exhibited. Makers of parts for trucks alone, such as heavy axles, cast steel wheels, etc., are there, but the truck makers who would exhibit are forced to seek the attention of the dealer outside the show.

...

The Hurlburt Motor Truck Co., New York, has rented quarters in the Biltmore Hotel, where its 3½- and 5-ton chassis are on view. The Fulton Motor Truck Co., Farmingdale, N. Y., has its new 1½-tonner in one of the parlors of the Waldorf-Astoria. The Maxwell company is showing its new 1-tonner at the Biltmore. The Auto-car has space at the Martinique. The Hurd has rented space across the street from the Palace. In the street outside the building, shivering salesmen bid for the attention of passers-by to various makes of adapters attached to Fords, and to the Rush, Koehler and Vim light trucks.

...

Among those who attended the New York show last week were four dealers and sub-dealers of Studebaker cars who had won the trips to New York for making the sales to the most prominent men on the Studebaker "Prominent Buyers' Day" contest held recently. The winners were P. Gray Coburn of Norfolk, Va., who sold a car to Josephus Daniels; the Holmes Garage, Danville, Ill., which sold a car to Joseph Cannon; E. V. Barthmeir, who made a sale to Philander C. Knox, and C. R. Douglas, Westfield, N. Y., who secured Dr. C. G. Welch, the grape-juice king, as a customer. F. O. Henizer of Cleveland, a sub-dealer, selling through the Studebaker Corp. of Ohio, also won a prize through his sale to Frank Rockefeller.

RUBBER CLUB ELECTS

New York, Jan. 13—Officers and executives of the Rubber Club of America were re-elected at the annual meeting this week. The name of the club is changed to the Rubber Association of America. The official personnel follows: President, H. S. Firestone; vice-presidents, V. H. Cartwell, Kelly Springfield Tire Co., and H. S. Hotchkiss, U. S. Rubber Co.; secretary and treasurer, H. S. Vorhies.

I. M. C. A. Formed Body Will Clip Difficulties from Motoring

PHILADELPHIA, Pa., Jan. 15—To be able to travel anywhere with convenience, with perfect assurance of being recognized as a motorist of responsibility and of receiving first-class accommodations, is the purpose of the International Motor Clubs Association. The I. M. C. A., as it is called, is still in its infancy, but has prospects of becoming one of the largest as well as most unique associations of motorists in existence.

The association, with headquarters in Philadelphia, was founded a little more than two years ago as the result of a meeting of five men at a social club. Each had some special grievance against the existing order of things, and when it was decided to organize the I. M. C. A., it was given the motto "Motor without annoyance."

It often happens that a motorist in a strange city, not being familiar with its traffic regulations, runs amuck of the police department, and is sometimes fined for his ignorance of the law. If he is a member of the I. M. C. A. he is provided with a slip addressed to departments of public safety and magistrates certifying that the member whose name and photograph is attached "has received the personal indorsement of his bank as a citizen of responsibility who would not intentionally violate any law or ordinance governing traffic or safety regulations."

The object of this is to serve as a voucher that the member will appear in person or by attorney upon receipt of notice of action and will pay any fine or costs imposed upon adjudication of any charge for violation of the law governing motor cars.

FORD DEALERS ORGANIZE

Baltimore, Md., Jan. 15—Following the lead of a number of cities the dozen Ford agents of this city met last week and organized the Ford Dealers' Association of Baltimore.

The body sent a letter to the Ford company, in which it asked that all prospects be divided equally between all of the city dealers. The plan of the Ford company is to hand over prospects to the dealers located in the sections of the prospects. This the dealers' association think is unfair.

The dealers also are working on a basis for the hourly service charge in garages and with this done all of the dealers will have a fixed charge for Ford repairs. Those who first started the move here to organize the local dealers did so following the reading of accounts of other cities which appeared in *MOTOR AGE* recently.

Alabama Gets Highway Arm of Jackson to Go Through This State as Far as Montgom- gomery, Possibly to Mobile

New Field Secretary Appointed Af- ter Birmingham Meeting

LOUISVILLE, Ky., Jan. 13—L. P. Haney, Louisville, now connected with the state department of roads as division engineer, is the new field secretary of the Jackson Highway Association, according to announcement made yesterday, following the return of President Peter Lee Atherton, Eugene Stuart and Emory G. Dent, the latter of Bowling Green, from the meeting of the association held in Birmingham Thursday. Mr. Haney will have headquarters in Louisville with President Atherton. He will begin his duties March 1.

Messrs. Atherton and Stuart, who held the proxies of Kentucky and Indiana members, also brought back the news that a spirited session had ended in a vote to extend the Jackson highway through Alabama under an arrangement whereby the extension will be known as the Alabama-Jackson highway and the Alabama organization will have a separate incorporation, although it will have representation in the main association. This project caused a break at the Jackson Highway Association meeting which was held in Louisville last October, because the Mississippi delegates who won out in securing the official routing of the main road through Mississippi instead of Alabama, insisted upon having a whole victory or nothing.

At Thursday's meeting, however, the arrangement described was satisfactorily regarded by the Mississippi contingent at the close of the meeting and all elements in the organization now have been harmonized.

STUDEBAKER BUYS STAYER

Chicago, Jan. 15—The plant of the Stayer Carriage Co., here, has been purchased by the Studebaker Corp., which will use it for the assembling of cars. This plant covers the block between 76th and 77th streets, between the Rock Island line on the east and the Chicago Belt line on the west. The buildings are four stories and contain approximately 300,000 square feet of floor space, being well suited for assembly work.

The plant will be put in operation as soon as the necessary equipment can be installed. It is expected that with this assembly plant in Chicago, it will be possible to give better service to dealers in the west and northwest. Better shipping facilities are said to have prompted Studebaker to make this move, since the possibility of getting freight cars in Chicago are considerably better than in points East.

Competitive Records—1909 to Date

DIVISION ONE SPEEDWAY RECORDS, CLASS "B" STOCK CAR SPEEDWAY RECORDS, CLASS "B" STOCK CHASSIS (Piston Displacement) 101 TO 230 CUBIC INCHES

Distance Miles	Time	Driver	Car	Place	Date
4	3:49.00	Witt	E. M. F.	Atlanta	Nov. 3, 1910
5	4:35.47	L. Chevrolet	Buick	Indianapolis	July 2, 1910
10	8:55.40	L. Chevrolet	Buick	Indianapolis	July 2, 1910
20	19:51.00	Knipper	Chalmers	Atlanta	Nov. 12, 1909
50	50:36.00	Nelson	Buick	Atlanta	Nov. 9, 1909
100	1:40:48.81	Knipper	Chalmers	Atlanta	Nov. 10, 1909
231 TO 300 CUBIC INCHES					
5	4:16.00	Dawson	Marmon	Indianapolis	July 2, 1910
10	8:16.08	Harroun	Marmon	Indianapolis	May 27, 1910
20	17:10.70	Chevrolet	Buick	Atlanta	Nov. 11, 1909
25	21:48.92	Harroun	Marmon	Indianapolis	May 30, 1910
50	42:41.33	Harroun	Marmon	Indianapolis	May 30, 1910
75	67:31.07	Harroun	Marmon	Atlanta	Nov. 11, 1909
100	1:30:08.31	Harroun	Marmon	Atlanta	Nov. 11, 1909
301 TO 450 CUBIC INCHES					
5	4:05.76	Kincald	National	Indianapolis	May 27, 1910
10	7:55.12	Altken	National	Indianapolis	July 2, 1910
15	11:48.78	Altken	National	Indianapolis	July 1, 1910
20	15:57.63	Dawson	Marmon	Indianapolis	May 27, 1910
50	39:47.35	Dawson	Marmon	Atlanta	Nov. 3, 1910
75	1:00:16.34	Dawson	Marmon	Indianapolis	May 27, 1910
100	1:23:43.11	Kincald	National	Indianapolis	May 27, 1910
150	2:05:02.17	Chevrolet	Buick	Atlanta	Nov. 9, 1909
200	2:46:48.47	Chevrolet	Buick	Atlanta	Nov. 9, 1909
250	4:38:57.40	Burman	Buick	Indianapolis	Aug. 19, 1909
451 TO 600 CUBIC INCHES					
5	4:01.36	Oldfield	Knox	Indianapolis	May 30, 1910
10	7:47.71	Robertson	Flat	Atlanta	Nov. 11, 1909
20	15:57.41	De Palma	Flat	Atlanta	May 5, 1910
50	42:02.98	Robertson	Flat	Atlanta	Nov. 13, 1909
100	1:22:35.35	Robertson	Flat	Atlanta	Nov. 13, 1909
150	2:05:00.63	Robertson	Flat	Atlanta	Nov. 13, 1909
200	2:53:46.32	Hibrow	Bainier	Atlanta	Nov. 13, 1909

SPEEDWAY RECORDS, CLASS "C" NON-STOCK (Piston Displacement)

161 TO 230 CUBIC INCHES					
5	4:20.20	J. Nikrent	Buick	Los Angeles	April 15, 1910
10	8:40.17	J. Nikrent	Buick	Los Angeles	April 15, 1910
15	13:14.52	J. Nikrent	Buick	Los Angeles	April 9, 1910
20	17:37.36	J. Nikrent	Buick	Los Angeles	April 9, 1910
25	21:12.42	Tower	Flanders	Los Angeles	May 5, 1912
50	43:49.69	Endicott	Cole	Los Angeles	April 9, 1910
231 TO 300 CUBIC INCHES					
1	0:45.60	De Palma	Mercer	Los Angeles	May 5, 1912
2	1:31.53	De Palma	Mercer	Los Angeles	May 5, 1912
3	2:17.17	De Palma	Mercer	Los Angeles	May 5, 1912
4	3:02.70	De Palma	Mercer	Los Angeles	May 5, 1912
5	3:47.34	De Palma	Mercer	Los Angeles	May 5, 1912
10	7:27.33	De Palma	Mercer	Los Angeles	May 5, 1912
15	11:11.17	De Palma	Mercer	Los Angeles	May 5, 1912
20	14:56.05	De Palma	Mercer	Los Angeles	May 5, 1912
25	18:53.20	J. Nikrent	Coe	Los Angeles	May 5, 1912
50	42:30.08	Stefert	Dorris	Los Angeles	April 8, 1910
75	1:03:54.28	Harroun	Marmon	Los Angeles	April 8, 1910
100	1:25:22.07	Harroun	Marmon	Los Angeles	April 8, 1910
301 TO 450 CUBIC INCHES					
5	3:40.36	J. Nikrent	Buick	Los Angeles	April 17, 1910
10	7:36.91	J. Nikrent	Buick	Los Angeles	April 17, 1910
15	12:04.99	Dawson	Marmon	Los Angeles	April 15, 1910
20	16:04.40	Harroun	Marmon	Los Angeles	April 15, 1910
25	20:08.99	Harroun	Marmon	Los Angeles	April 15, 1910
50	39:53.55	Harroun	Marmon	Los Angeles	April 15, 1910
451 TO 600 CUBIC INCHES					
5	3:38.61	Oldfield	Knox	Los Angeles	April 16, 1910
10	7:20.60	Oldfield	Knox	Los Angeles	April 16, 1910
15	11:32.34	Marquis	Isotta	Los Angeles	April 10, 1910
20	15:29.18	Marquis	Isotta	Los Angeles	April 10, 1910
25	19:24.92	Marquis	Isotta	Los Angeles	April 10, 1910
50	39:20.69	Marquis	Isotta	Los Angeles	April 10, 1910

DIVISION TWO NON-COMPETITIVE RECORDS SPEEDWAY RECORDS, CLASS "B" STOCK CAR (Piston Displacement)

231 TO 300 CUBIC INCHES					
10	7:54.40	Mulford	Hudson	Sheepshead Bay	Nov. 25, 1915
20	15:45.80	Mulford	Hudson	Sheepshead Bay	Nov. 25, 1915
50	39:30.80	Mulford	Hudson	Sheepshead Bay	Nov. 25, 1915
100	1:20:21.40	Mulford	Hudson	Sheepshead Bay	Nov. 29, 1915

SPEEDWAY RECORDS, CLASS "B" STOCK CHASSIS (Piston Displacement)

160 CUBIC INCHES AND UNDER					
1	0:56.50	Witt	Flanders	Indianapolis	Nov. 13, 1911
5	4:22.98	Witt	Flanders	Indianapolis	Nov. 13, 1911
10	9:27.49	Witt	Flanders	Indianapolis	Nov. 13, 1911
15	14:13.26	Witt	Flanders	Indianapolis	Nov. 13, 1911
20	19:00.87	Witt	Flanders	Indianapolis	Nov. 13, 1911

SPEEDWAY RECORDS, CLASS "C" NON-STOCK (Piston Displacement)

160 CUBIC INCHES AND UNDER					
5	4:26.08	Evans	Flanders	Indianapolis	Nov. 13, 1911
10	8:53.97	Evans	Flanders	Indianapolis	Nov. 13, 1911
15	13:24.00	Evans	Flanders	Indianapolis	Nov. 13, 1911
20	17:54.82	Evans	Flanders	Indianapolis	Nov. 13, 1911

SPEEDWAY RECORDS, REGARDLESS OF CLASS, STOCK SPEEDWAY RECORDS, REGARDLESS OF CLASS, NON-STOCK

1/2	8.16	Burman	Riltzen-Benz	Indianapolis	May 29, 1911
1/4	16.60	Oldfield	Christie	Tacoma	July 5, 1915
1/8	21.40	Burman	Riltzen-Benz	Indianapolis	May 29, 1911
1	31.60	Oldfield	Christie	Tacoma	July 5, 1915

Distance Miles	Time	Driver	Car	Place	Date
2	1:10.00	Oldfield	Christie	Tacoma	July 5, 1915
3	1:54.83	Brugg	Flat	Los Angeles	May 5, 1912
4	2:33.37	Brugg	Flat	Los Angeles	May 5, 1912
5	3:00.00	Orr	Maxwell	Omaha	July 5, 1915

ONE MILE CIRCULAR DIRT TRACK RECORDS, STOCK ONE MILE CIRCULAR DIRT TRACK RECORDS, NON-STOCK

1	40.20	Disbrow	Simplex	St. Louis, Mo.	Aug. 8, 1914
2	1:32.60	Disbrow	Simplex	St. Louis, Mo.	Aug. 8, 1914
3	2:27.81	Disbrow	Simplex	Cleveland, O.	Sept. 14, 1912
4	3:17.02	Disbrow	Simplex	Cleveland, O.	Sept. 14, 1912
5	4:06.58	Disbrow	Simplex	Cleveland, O.	Sept. 14, 1912

STRAIGHTAWAY RECORDS, CLASS "B" STOCK CHASSIS

(Piston Displacement)					
1	35.11	Mulford	231 TO 300 CUBIC INCHES		April 10, 1916
			Hudson	Daytona	
301 TO 450 CUBIC INCHES					
*1	26.75	Mers	National	Jacksonville	Mar. 29, 1911
1	40.32	Wilcox	National	Jacksonville	Mar. 30, 1911

STRAIGHTAWAY RECORDS, REGARDLESS OF CLASS, STOCK STRAIGHTAWAY RECORDS, REGARDLESS OF CLASS, NON-STOCK

*1	15.58	Burman	Biltzen-Benz	Daytona	April 23, 1911
1	25.40	Burman	Biltzen-Benz	Daytona	April 23, 1911
2	51.24	Burman	Biltzen-Benz	Daytona	April 23, 1911
5	2:34.00	Hemery	Darracq	Daytona	Jan. 24, 1906
15	10:00.00	Lancela	Flat	Daytona	Jan. 29, 1906

(Standing Start)

1	40.53	Oldfield	Benz	Daytona	March 10, 1910
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HOUR RECORDS SPEEDWAY, CLASS "B" STOCK CHASSIS

(Piston Displacement)						
231 TO 300 CUBIC INCHES						
12	924	Mulford	Hudson	Sheepshead Bay	May 1-2, 1916	
24	1,819	Mulford	Hudson	Sheepshead Bay	May 1-2, 1916	

SPEEDWAY RECORDS REGARDLESS OF CLASS, STOCK SPEEDWAY RECORDS REGARDLESS OF CLASS, NON-STOCK

1	40.23	De Palma	Mercedes	Des Moines, Ia.	June 24, 1916
2	1:12.85	Resta	Peugeot	Sheepshead Bay, N. Y.	Sept. 30, 1916
3	1:54.81	De Palma	Mercedes	Des Moines, Ia.	June 24, 1916
4	2:20.08	Resta	Peugeot	Sheepshead Bay, N. Y.	Oct. 9, 1915
5	2:56.35	Resta	Peugeot	Omaha, Neb.	July 15, 1916
10	5:45.03	Aitken	Peugeot	Sheepshead Bay, N. Y.	Sept. 30, 1916
15	8:54.72	Mulford	Peugeot	Omaha, Neb.	July 15, 1916
20	11:15.79	Aitken	Peugeot	Sheepshead Bay, N. Y.	May 13, 1916
25	15:00.38	Mulford	Peugeot	Omaha, Neb.	July 15, 1916
30	28:04.63	Resta	Peugeot	Sheepshead Bay, N. Y.	Oct. 9, 1915
75	45:05.31	Rickenbacher	Maxwell	Omaha, Neb.	July 15, 1916
100	56:57.72	Resta	Peugeot	Sheepshead Bay, N. Y.	Nov. 2, 1915
150	1:26:58.65	Aitken	Peugeot	Sheepshead Bay, N. Y.	Sept. 30, 1916
200	1:55:23.53	Aitken	Peugeot	Sheepshead Bay, N. Y.	Sept. 30, 1916
250	2:23:04.03	Aitken	Peugeot	Sheepshead Bay, N. Y.	Sept. 30, 1916
300	2:55:32.23	Anderson	Stutz	Sheepshead Bay, N. Y.	Oct. 9, 1915
350	3:24:42.99	Anderson	Stutz	Sheepshead Bay, N. Y.	Oct. 9, 1915
400	4:04:48.98	Resta	Peugeot	Chicago	June 26, 1915
450	4:35:05.78	Resta	Peugeot	Chicago	June 26, 1915
500	5:07:26.00	Resta	Peugeot	Chicago	June 26, 1915

ONE MILE CIRCULAR DIRT TRACK RECORDS, STOCK ONE MILE CIRCULAR DIRT TRACK RECORDS, NON-STOCK

10	8:16.40	Burman	Peugeot	Bakersfield, Cal.	Jan. 3, 1915
15	12:23.20	Burman	Peugeot	Bakersfield, Cal.	Jan. 3, 1915
20	16:25.60	Burman	Peugeot	Bakersfield, Cal.	Jan. 3, 1915
25	20:28.60	Burman	Peugeot	Bakersfield, Cal.	Jan. 3, 1915
50	40:57.80	Burman	Peugeot	Bakersfield, Cal.	Jan. 3, 1915
75	1:08:56.00	Burman	Peugeot	Galesburg, Ill.	Oct. 22, 1914
100	1:31:30.00	Alley	Duesenberg	Hamline, Minn.	Oct. 24, 1914
150	2:30:51.00	Wishart	Merced	Columbus, O.	Aug. 25, 1912
200	3:21:48.00	Mulford	Mason Special	Columbus, O.	July 4, 1913

STRAIGHTAWAY RECORDS, CLASS "B" STOCK CHASSIS

(Piston Displacement)						
5	4:24.18	Towers	161 TO 230 CUBIC INCHES	Warren-Detroit	Jacksonville	Mar. 29, 1911
10	9:10.52	Towers		Warren-Detroit	Jacksonville	Mar. 30, 1911
10	8:16.35	Wilson	231 TO 300 CUBIC INCHES	Cole	Jacksonville	Mar. 29, 1911
5	3:56.82	Wilcox	301 TO 450 CUBIC INCHES	National	Jacksonville	Mar. 30, 1911
10	8:03.67	Merz		National	Jacksonville	Mar. 29, 1911

STRAIGHTAWAY RECORDS, CLASS "C" NON-STOCK

(Piston Displacement) STRAIGHTAWAY RECORDS, REGARDLESS OF CLASS, STOCK STRAIGHTAWAY RECORDS, REGARDLESS OF CLASS, NON-STOCK

10	5:14.40	Bruce-Brown	Benz	Daytona	Mar. 24, 1909
20	13:11.92	Burman	Bulck Bug	Jacksonville	Mar. 30, 1911
50	35:52.31	Burman	Bulck Bug	Jacksonville	Mar. 28, 1911
100	1:12:45.20	Bernin	Renault	Daytona	Mar. 6, 1908
150	1:55:18.00	Disbrow	Special	Jacksonville	Mar. 31, 1911
200	2:34:12.00	Disbrow	Special	Jacksonville	Mar. 31, 1911
250	3:14:55.00	Disbrow	Special	Jacksonville	Mar. 31, 1911
300	3:53:38.50	Disbrow	Special	Jacksonville	Mar. 31, 1916

HOUR RECORDS

SPEEDWAY, REGARDLESS OF CLASS, NON-STOCK

Hrs.	Miles	Driver	Car	Place	Date
1	74	Harroun	Marmion	Los Angeles	April 16, 1910
2	148	Harroun	Marmion	Los Angeles	April 16, 1910
24	1,491	Verbeck & Hirsch	Flat	Los Angeles	April 8, 1910

ONE MILE CIRCULAR DIRT TRACK, REGARDLESS OF CLASS, STOCK CHASSIS	24	1,196	Patschke & Mulford	Lozier	Brighton Beach	Oct. 15, 1909
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ONE MILE CIRCULAR DIRT TRACK, REGARDLESS OF CLASS, NON-STOCK	24	1,253	Pool & Patschke	Stearns	Brighton Beach	Aug. 19, 1910
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STRAIGHTAWAY, REGARDLESS OF CLASS, NON-STOCK	1	81.65	Disbrow	Special	Jacksonville	Mar. 28, 1911
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Gas Continues Soaring

Higher Scale of Prices Becomes Evident in Many Sections Throughout Country

Both Standard Oil and Independents Boost Cost to Consumer

CHICAGO, Jan. 15—Prices of gasoline throughout the country are gradually being adjusted to the higher scale started the first of the year by the Standard Oil Co., and the independents. The prices last week embraced such territories as Pittsburgh, Oklahoma, Alabama and Mississippi, New Mexico, Arkansas and Louisiana. The Atlantic Refining Co., increased gasoline prices at Pittsburgh as follows: Regular grade to 25 cents, 68-70 degrees to 28 cents, 73-76 degrees to 32 cents a gal. Previous prices for the three grades were 25, 27 to 29 cents respectively.

Advances made by the Texas Company in the following states, were uniformly 1 cent a gal., the new prices being: Oklahoma 22 cents, Alabama maximum 26, minimum 22½ cents, Mississippi maximum 23½, minimum 21½. Kerosene has been advanced ½ cent a gal. in New Mexico. This company has advanced prices in Arkansas and Louisiana 2½ cents a gal., the maximum and minimum prices in these states now being: Arkansas 23½ and 23, Louisiana 23 and 21 cents.

FOREIGN MARKETS FOR CARS

New York, Jan. 13—At a meeting of the export managers of the National Automobile Chamber of Commerce held here yesterday, possibilities of developing the foreign market for American-made cars were discussed and reasons were pointed out why American manufacturers should interest themselves to a greater extent in foreign trade. One of the most important reasons advanced is the scope of the foreign market and the fact that people in foreign countries are looking with much more favor on American-made cars than ever before. It is said that outside of the principal producing countries—that is, France, Germany, Italy and Great Britain—there are \$60,000,000 worth of cars imported every year. In the last normal year before the outbreak of the war France exported approximately \$45,000,000 worth of cars; Germany, \$20,000,000; Great Britain, \$15,000,000 and Italy, \$5,000,000, while in the same year, 1913, this country exported \$27,000,000 worth of cars.

COMPILES COMPETITIVE RECORDS

New York, Jan. 15—The American Automobile Association has issued a chart showing the competitive records of stock and non-stock cars on track and speedway, as well as hour and straightaway records as shown on this and the preceding page.





What Constitutes Practical Direction or Traffic Signals

SEATTLE, Wash.—Editor MOTOR AGE—That the day has arrived, or is fast approaching, when we must definitely determine just what are proper and practical direction signals for motor vehicles is evidenced by the tendency, national in its scope, to enact laws relating thereto, one of which was recently approved and passed at St. Louis, Mo., the text of which was published in MOTOR AGE, December 28, 1916.

From a perusal of this ordinance it would appear that certain of its provisions were drafted by an individual interested, directly, or indirectly, in the sale of a signaling device having features that measured up to the particular requirements of those provisions, with no thought having been given to the possible dangers and legal complications likely to arise through their enforcement.

This article is written not only as an attack on those provisions, but is directed against further legislation of this sort, until it has been determined just what are practical direction signals, and a standard adopted.

Desires Universal Signals

Be it understood, there is no ulterior motive for my statements. I am not in any way interested in, or connected with a signaling device. I was recently the victim of an accident that nearly cost me my life, caused by the direction signals—or lack of them—in vogue to-day. My interest in the matter, therefore, starts and stops in a desire to see the universal adoption of signals that will in the future tend to make more secure my own neck, and that of those about me.

Section 1335 of the ordinance approved by the council of St. Louis provides that a "slow" and "stop" signal shall be displayed at the rear of a vehicle when a stop is contemplated, and until the vehicle has ceased its forward movement. It needs but little consideration to perceive that not only are such signals unnecessary, but they are a positive menace. They are neither safe nor sane and they are an out and out discredit to those who fathered them.

When a car makes a turn, be it to the right or to the left, it breaks into the course of pedestrians and other traffic, and it is to the advantage of all that the driver of such car make known his intentions in advance, but when a stop is contemplated the vehicle is directed out of the course of all traffic, to the curb, whereupon it has ceased to be a source of danger.

Suppose an operator of a vehicle, traveling at a speed just within the limit, is

suddenly confronted with the alternative of displaying in turn a "slow" and "stop" signal or running down a pedestrian. If he chooses to obey the ordinance and remain secure with the law, the obstacle in his path must be crushed. If he considers the life, and jams his brakes, the driver behind, secure in the fact that a "stop" signal has not been displayed, runs him down. The pedestrian is unharmed, by reason of which an ordinance has been violated, and the violator is obliged to suffer the damages done himself, as well as that to those following. Life is made less important to the operator than the displaying of a signal!

Do such signals tend to further the interest of safety?

The very nature of the direction or traffic signal problem necessitates a thorough and careful analysis of the conditions to be met before there can be a practical application. If I correctly understand the policy of MOTOR AGE, its columns are open to an intelligent discussion, and an exchange of views on the subject. These are my contentions as to what are necessary signals. To begin at its source, grouping questions and answers, they follow:

Is there any present need for any kind of signals?

Yes.

Why?

Congested streets, traffic regulation, danger alike to operators of vehicles and pedestrians.

Is a mechanical signal to be preferred to indication by movement of arm?

Yes.

Why?

Signals limited to those devices capable of performing; less confusion; closed or curtained cars; manipulation without removing hands from wheel; easier to standardize.

What movement of vehicle should signal be capable of indicating?

Straight ahead, right turn and left turn.

Why?

None other necessary.

Where should signal device be attached?

Left rear fender; in line of vision of driver behind, and right front fender.

Why?

Greatest vision angle for traffic officer.

Should means of indication be by sound or pointed?

Pointer.

Why?

Eye catches with less effort; brain more quick to translate.

Should indicator be interior or exterior, i. e., operate out of casing or in casing behind transparent material?

Exterior.

Why?

If interior, indication would be obscured on car having traveled on dusty road.

How operated? Why?

Electric. Applicable to any modern car.

How far visible?

50 to 100 feet.

Should it be automatic or operated at will?

Operated at will.

Why?

Signal to be of avail must be given in advance.

I am not going to insist that a signaling device will be ineffective, and that it will fail in its purpose unless it measures up to all of the requirements herein set forth, but I do insist, and I firmly believe that the apparatus that will ultimately come into general use, will in the main, embody the features which I have suggested.

Inasmuch as no extensive action has yet been taken pertaining to laws governing signals, it occurs to me that here would be the logical place for MOTOR AGE and other supporters of the movement for standardization of traffic rules, to insert a most effective wedge. It would be much easier to set a standard for signals at this time than at a later date, when fifty-seven varieties will have been placed in use.

I would suggest that inventors and producers of signal apparatus be prevailed upon to submit their products to a standardization board, to be comprised of car manufacturers, safety first league officials, traffic officials, etc., through and out of whose investigations there would emerge a standard, and a survival of the fittest.—M. E. Ash.

PUBLIC SQUARE FOR TRAFFIC

Trenton, N. J., Jan. 15—To relieve the congestion of traffic, City Commissioner George B. LaBarre is advocating that the city create a great public square in the heart of the downtown district by purchasing and tearing down a number of buildings. The improvement would cost upward of \$1,000,000. A municipal cab stand, trolley terminal, public comfort stations, etc., would be features.

MAY LIMIT TEXAS SPEED

Austin, Tex. Jan. 13—Gov. James E. Ferguson in his biennial message to the legislature, which convened Jan. 9, recommends that a stop be put to speeding. He says:

"In order that the general public may enjoy the use of the highways with reasonable safety, I am in favor of making it a jail penalty to run a motor car in any incorporated town more than 10 miles an hour or more than 24 miles an hour on a country road. There is an imperative demand that the speed mania be dealt with in some drastic way."

In this message he gives his official endorsement to the plan of passing a law creating a state highway commission. There is a unity of effort being expended to get a highway commission for Texas that the state may share in the federal aid given to states with a highway body to administer the funds.







We are told that the best way for a woman to learn to drive a car is to make up her mind not to learn to drive it at all but merely to run it. The theory is that if she doesn't have an ambition to really know her car's mechanical heart her mind will be that much freer to shifting gears, steering and so on. Now, there might be something in this, and there probably is more than appears on the surface. The same giver of free advice says that anybody can run a car as long as nothing gets the matter with it, but it takes more to drive a car. Our advice would be to start out on this hypothesis: Given a car to learn to run. Then, gradually, as you learn more about the car, become a driver capable of meeting all ordinary road trouble and of knowing when your car needs better attention than you can give it.

Acquaintance Hurries Confidence

To help hurry the coming confidence, get acquainted with your car as soon as possible, however. Respect its individuality and study it so you will not rub its fur the wrong way, so to speak. For the motorist and the car should be good friends and, as such, unwilling to ruffle the other. Sometimes you think your car is not as a friend should be—when you are stalled out on the road, for instance. But perhaps that stalling is more your fault than the car's. Acquaintance should make it possible to avoid such misunderstanding.

You might confine yourself to short runs and avoid heavy traffic at first. There is an almost certain likelihood that you will have the strain of fatigue as well as of lack of confidence to undergo if you try very long runs for a while after you first begin driving. You should get all the information possible about your car. No doubt you will have many ups and downs. That is like life, anyway. But forget you are a novice as soon as you can, and you will find yourself the owner of that much more confidence. But, by all means, try to have the same confidence as if you were at home quietly rocking. For it is possible to take the rocking chair to the car instead of bringing the car to the rocking chair.

Feminine Motor Notes

MRS. JOHN L. KIMBELL, director of the Jefferson Highway Association for the state of Louisiana, is the only woman holding a prominent position in highway work in the United States, it is said. The association credits her with obtaining the Jefferson Highway day at the Louisiana state fair last month.

Milwaukee did itself proud at its motor show with a showing of motor fashions. A parade with special attention to sport cloths was conducted daily.

Mrs. Earle W. Hadlock has the distinction of having ridden in a real live White motor fire fighting-machine on its initial trip from the Boston office of the maker

Beauty Hints for the Woman Motorist



No. 18

A MUSH made of raw cornmeal and sour milk is soothing to reddened hands. Oatmeal and soap in tepid water will clean the hands, when soap alone might irritate them. A mixture of glycerine, rose water and benzoin is also a good, simple cleanser. The mixture should be rubbed on softly. Cold cream, of course, is well known as a cleanser. However, be sure to know your cold cream and know that it contains nothing injurious to your skin. The cream applied with small pieces of cotton does wonders with the worst of hands. Sleeping gloves are a good accessory to include in the outfittings of your car.

If your hands receive some stain from tinkering you will find these suggestions helpful. When available, fruits are good. They not only cleanse but beautify. Tomatoes, strawberries, watermelon, cucumbers and lemons—doubtless the list could be even longer. Olive oil can beautify your hands also through application every night. Care must be taken in its selection, too, as the impure olive oil will darken the skin and produce hairs. Hot milk also is used.

to Augusta, Ga. The trip was a honeymoon trip, and the novelty of the transportation is explained by the need of prompt delivery and by the willingness of the young couple to see that it was delivered promptly.

Chicago woman motorists are especially lucky since the Golf Shop, a concern that carries much of interest for motoring apparel, has opened a woman's shop in one of the largest Chicago specialty shops buildings.

Mrs. W. C. Bose and Miss Mary L. Parker, Rock Island, Ill., are two woman motorists with long tours ahead of them. With Doctor Rose they intend to be out five months, following the Logan-Lee highway from Springfield, Ill., through Paducah, Ky., to Nashville, Tenn., at which place they will start to follow the Dixie highway and the Diagonal trail to Miami, Fla. They will go west to New Orleans from Miami over the Jefferson Davis Memorial highway and return over the Burlington Way, this making five organized highways which they will use.

The official organ of the Jefferson Highway Association plans to publish a series

of historical articles on the states through which the Jefferson highway goes, and the first one, which is on Missouri, is written by Mrs. George E. McIninch of St. Joseph, Mo.

You can decide for yourself whether you have a crow to pick with the powers that be in regard to clothes. From the results of the annual convention of the National Association of Clothing Designers, which was held in Cincinnati, Ohio, recently, we learn that men's clothes will change little next fall and winter. The same double breasted sack coat of this year may be "redded up" for next year, and all that you need do to his sack coat is to put a ruffle on to make it between 33 and 31½ in. long, hoist the belt a little or take the belt off, and there you—and he—are. Overcoats are to be raglan and ulsterette again, and the ulster or trench type will be 46 in. long and the box coat 42 in. However, don't let this worry you. You can wear coats of this kind, too, along with those of the great variety promised for women.

She Learned How

SHE sent for a lot of catalogs, and then she studied them. After much indecision she decided to buy a four-seated runabout, thinking that she could turn the corners better in the shorter car. Then she announced that she was going to learn to run it and do the ordinary, routine road repairs.

So far, so good. For an instructor she turned to an old friend, a much traveled friend, who could talk Rome and Athens and Paris but never had been West. Why she didn't get an instructor from among the men belonging to the company that sold her the car she didn't say. She merely announced she was going to learn to run it and do the road repairing, and she found the best educated instructor she could to teach her.

Garage Furnished First Scene

The first day the scene lay in the garage, newly built for her particular use. With the rear wheels jacked clear of the floor and her instructor's eye on all her motions she went through the operations of starting, shifting gears and so on as if she were actually on the road. She enjoyed it immensely.

The second day she and the instructor drove out into the country, the instructor at the wheel and her hand on the wheel to feel the motion of steering.

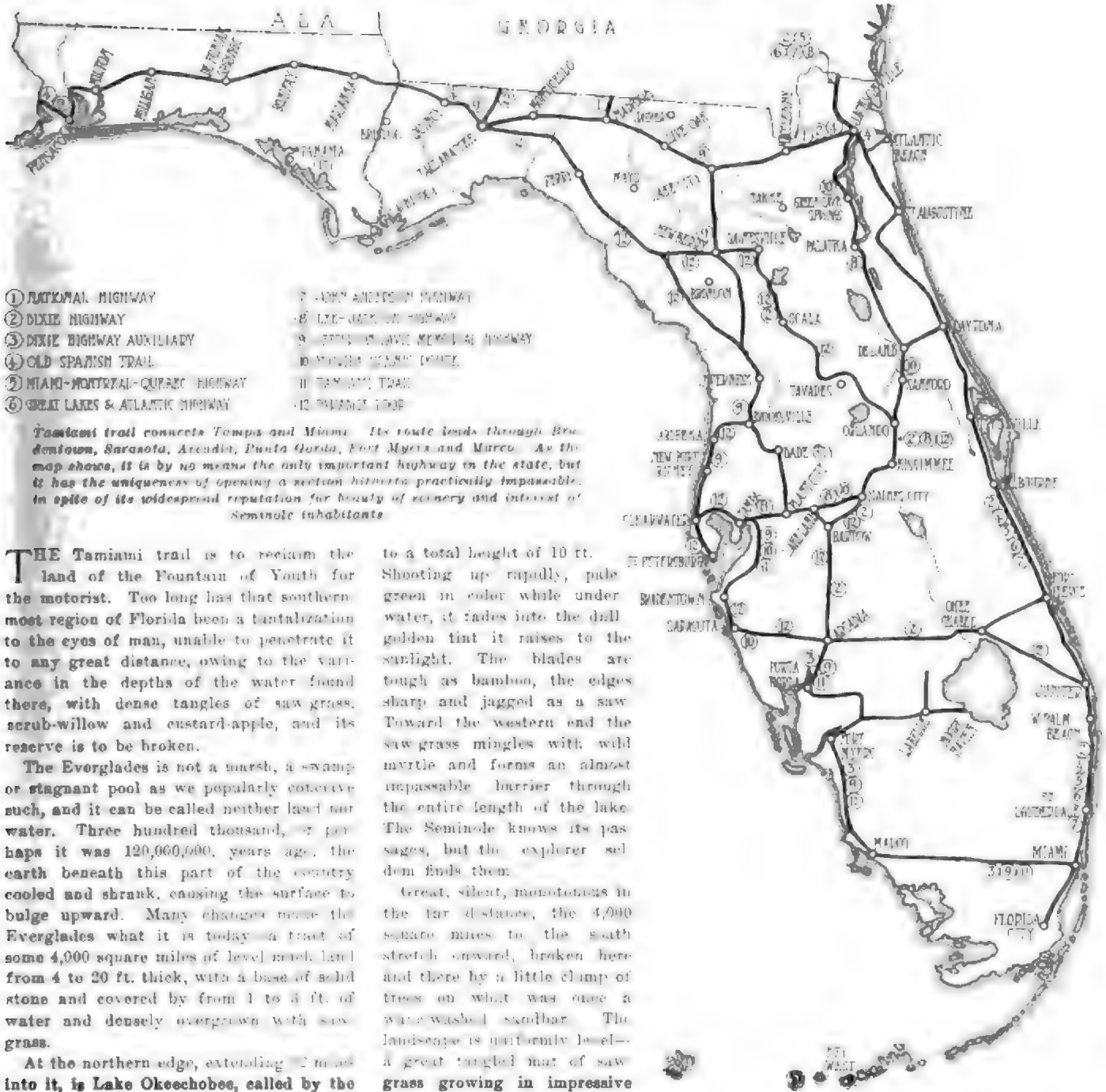
The third day she drove 5 miles down a wide road, landing at the garage after barking both trees at the entrance to the drive and narrowly missing a corner of the house. But she got the car in the garage and shut the door.

Then she went in the house and called up her friends to tell them she had learned to drive the car and it was easy as everything.



How Tamiami Trail Came Into Being

What the Road Builder Had to Do to Conquer the Everglades' Stubbornness



THE Tamiami trail is to reclaim the land of the Fountain of Youth for the motorist. Too long has that southernmost region of Florida been a tantalization to the eyes of man, unable to penetrate it to any great distance, owing to the variance in the depths of the water found there, with dense tangles of saw grass, scrub-willow and custard-apple, and its reserve is to be broken.

The Everglades is not a marsh, a swamp or stagnant pool as we popularly conceive such, and it can be called neither land nor water. Three hundred thousand, or perhaps it was 120,000,000, years ago, the earth beneath this part of the country cooled and shrank, causing the surface to bulge upward. Many changes made the Everglades what it is today—a tract of some 4,000 square miles of level marsh land from 4 to 20 ft. thick, with a base of solid stone and covered by from 1 to 3 ft. of water and densely overgrown with saw grass.

At the northern edge, extending 12 miles into it, is Lake Okeechobee, called by the Indians Lake Mayaimi, an irregular body of water 130 miles north and south and 70 miles east and west, with a bed below sea level for the most part. Its warm waters guard the tender vegetation of the South and help make the beauty which conceals the undesirability of the Everglades. Over the rocky bottom of the lake itself is also a layer of muck, formed of alluvial deposit and decayed vegetation, and in this muck saw-grass takes root and grows

to a total height of 10 ft. Shooting up rapidly, pale green in color while under water, it fades into the dull golden tint it raises to the sunlight. The blades are tough as bamboo, the edges sharp and jagged as a saw. Toward the western end the saw grass mingles with wild merrill and forms an almost impassable barrier through the entire length of the lake. The Seminole knows its passages, but the explorer seldom finds them.

Great, silent, monotonous in the far distance, the 4,000 square miles to the south stretch onward, broken here and there by a little clump of trees on what was once a wave-washed sandbar. The landscape is uniformly level—a great tangled mat of saw grass growing in impressive silence.

It was long thought the chief products of the Everglades were always to be Seminoles and alligators. A Spaniard, Esclente de Fontenada, was the first white man to enter this mysterious region, but little was learned from his 17 years' sojourn there as slave to the great cacique Caloa, who captured him when shipwrecked. Many expeditions have been sent out by the United States, but all failed. The explorers re-

ported the Everglades fascinating but to be avoided, a forest of trees, rank undergrowth and saw-grass, impenetrable and practically valueless. The lake itself was said to be only a mixture of currents leading nowhere in particular and generally ending in a comparatively still pool with a labyrinth of passages from which no egress is.

But all this has changed. The Seminoles

and alligators are still products of the Everglades, but other products have been added to keep them company. In spite of the intense hunt for the alligators for their skins, they are still abundant. While no figures as to the number of Seminoles are available, they are supposed to number about 1,500 and to live on the remote islands, where they fish, hunt, trap and farm to a very limited degree.

The reclamation began July 8, 1906. The south branch of the New river was deepened and widened for drainage. Canals were made. In 1 year 10,000 acres were reclaimed, and the growing of tomatoes and other vegetables began. The actual commercial value of the soil was computed at \$6 a ton for the nitrogen in it. Four million acres were found suitable for the growing of sugar cane, and the lack of killing frosts promised opportunity for the growing of bananas and other tropical fruits.

Wide Sunny Spaces Always

Many think of the Everglades as a dark jungle. The contrary is true. It is said that no malaria-bearing mosquitoes breed here, because their type do not breed in open sunny spaces. And the growths are not all of shade, either. Hundreds of acres are covered with live oaks and bays, with wild cucumber, lemon and orange trees. The papaya, custard-apple, and prickly ash are common, and the cabbage palmetto, pine and rubber-tree are seen here and there. The egret, ibis and heron once awoke the echoes of the Everglades also, but the plume hunter has made them nearly extinct. Fish abound in the fresh waters, and terrapin and flat soft-shell turtle are plentiful, while the wild turkey adds his gobble to the mystery of the tangles.

Deer, otter, alligator and crocodile live side by side with the sinuous snake. But the most interesting residents are the Seminole Indians, who for centuries have inhabited this part of Florida, in defiance of many attempts to dispossess them.

The shores of the streams flowing through the Everglades have their own vegetation. Cocoa-plum trees and, where the earth is somewhat dry, the coontie-plant, or arrow-root, from which the Seminole gets his flour and starch, form borders. Mangroves shade the rivers as they find their way to the sea through the rocky channels worn by the ages and torn by modern drainage. The mangrove gives way to the cocoa-plum, and the cocoa-plum gives way to cypress, while pond lilies help make the scene of shifting green in which the lemon-like foliage of the cocoa-plum, the dark olive of the mangrove and the lighter green of the cypress cast their tinted shadows in the sunlight.

When the waters are low, the numerous islands and unstable stretches show tall, golden grass, gleaming in the sun and fading into the blue of the horizon. The climate knows no extreme of heat or cold,

and the mysterious beauty so peculiar to the Everglades is constant. The rainy season covers June and September, but the nature of the soil is such as to absorb the surplus waters that fall on the drained sections. Malaria, the usual accompaniment of the swamps and marshes we consider kin to the Everglades, is absent.

The Tamiami trail will not tell the whole story of the difficulties this tract of mystery and the unusual have offered each attempt to conquer them. Though the greater part of the trail will lie through the Everglades, beginning at Tampa, the city of split wood for quick fires, on the west and ending at Miami, the palm-shaded entrance beautiful to the Everglades, on the east.

About \$750,000 have been appropriated for the work, which is not only to open up a road for motorists through the Everglades, but to make possible more complete drainage. The construction will not be finished until 1918, and the total outlay is placed at more than \$1,000,000. With the exception of the bridges at Punta Gorda and Bradentown, a well-graded road, with a large part of it surfaced, will be ready from Tampa to Marco early in 1917, however. The contractors already are beginning the work of erasing the traces of the months of battle spent in conquering the muck and water of this section. Grass seed has been sowed along the embankments of the road, and property owners are dotting the wayside with palms and other tropical trees and foliage, so that by the time motorists can travel this way, only canals, small lakes and fertile fields will remain where once lay an impenetrable jungle of water, muck and mud.

Where Beauty Was Undeatable

The beauties of the Everglades proved a stumbling block in the way of highways in Florida for years. No rules of road engineering have been able to meet the problem of constructing the trail. Scrub mangrove and gram muck may give pleasure to the eye, but to the engineer it is the pleasure that hurts. The leaves on the trees shake and tremble. The mass of muck and mud, 12 ft. deep and extending hundreds of feet in every direction, quiver. The dredge engine finds its work difficult. For it is a 40,000-lb. machine, and the stretch is very unreliable. How it was done makes a tale in itself.

The motorist can follow this road to Marco in 1917, and he will miss all the thrills of this battle. But if he go soon after it is opened, he may see the brown bears, wild cats and other natives of the jungles, who frequently came within 200 yd. of the workmen to satisfy their curiosity as to what new creatures had come to share their solitude.

A great variety of road methods were necessary. In the 10 miles north of Marco cypress strands underlaid with boulder and bed rock; pine ridges of boulder and the hardest of hardpan; sand banks of clay;

rock ridges outcropping on the surface; cabbage palmetto land; scrub buttonwood; prairie land flooded in the rainy season; flat-woods land; saw-grass land; marsh-grass land; soft blue marl and shell land; all varieties of mangrove land; swamp land; tide flats; tide lands 1 to 2 ft. under water at high tide; bog lands; mud holes; muck ponds; creeks; rivers; bayous, and channels — these were some of the combinations the engineers had to cope with.

Land Was Drained Also

A land dredge machine of steel beam construction was used. It had a cubic yard dipper and straddled the canal and ran on its own tracks under its own power. The track was in 4-ft. sections pinned at the ends with flexible steel couplings, so the dredge could run on uneven ground. The tracks were 29 ft. apart, and a canal 24 ft. wide and 12 ft. deep was possible. The width, however, depended on the amount of material necessary for the roadbed, and the depth was kept constant with an idea of drainage.

Cutting through, jungle tangle, marl mass, sand, etc., were dumped to the side. The dump was leveled to grade and surfaced by hand with hoe and shovel. Through Williams Island jungle the cutting had to be made through thousands of switches, poles, brush, interwoven ferns and bamboo, rattan and vines. The clearing was at contract price of \$44 an acre, and some stretches could not be cleared for three times that.

The finished roadbed is 18 ft. wide with 1½ slope, 6-in. crown and 8-ft. beam. In removing rock ledges and stratum, explosives were used. The major part of the material was soft, so the big bucket on the dredge did all the excavating down to bed rock. The bed rock stood 30 days after being thrown up to dry. When thoroughly dried and settled, the pick and shovel crew went over it, leveling it down a little above grade to allow for rolling. A roller weighing 7 tons was used, and after the sub-grade had been rolled a rock surface of 12 in. was put on and rolled. The rock was then scarified, graded and rolled. Twenty-four-inch culverts were placed about every 600 ft. In Dade county, the heart of the Everglades, a 20-ft. spur road for a turn out will be provided about every 600 ft. also.

The trail is not only to bring the motorist to the Everglades, but to bring commercial profit to Florida also. The lack of drainage and accessibility has let hundreds of thousands of acres in the Everglades lie worthless for years. Experts claim that this plot contains the most fertile soil to be found in the world. The construction of the Tamiami trail removes all obstacles. The methods used to excavate the canal and throw up the rock and other material for the roadbed and deposit the unsuitable material, such as decayed vegetable matter, on the side does it.



The Motor Car Repair Shop



Process of Lapping Cylinders

WHERE a cylinder of a motor car engine has become worn slightly out of shape or where the rings do not bear equally on the surface of the cylinder wall, the defect may be remedied to a great extent, or entirely, depending on the magnitude of the defect, by lapping the cylinder wall. This measure will not cure the cylinder which has become scored. It applies only to one which has been worn a very few thousandths of an inch out of round.

The job can be done satisfactorily only with the use of an old piston of the same bore as the cylinder which is being worked upon. If one does not have the use of a drill press the hand operation, which will give a very satisfactory job, should be done as follows:

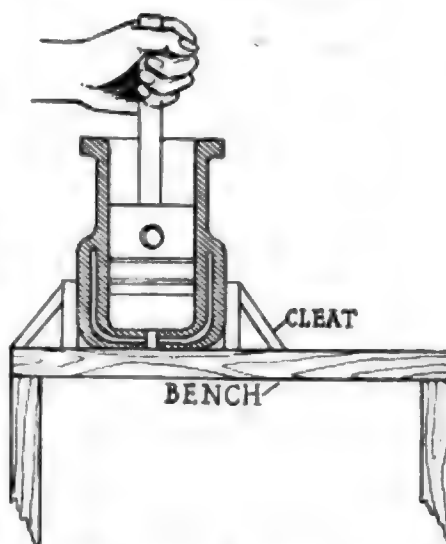
Support the cylinder in its inverted position on the work bench. Inasmuch as practically all motors of present-day construction are of the block-cast type, it is quite necessary that this heavy casting be substantially supported in an upright position in order that the lapping may be done most conveniently.

Cleating Cylinder Casting to Bench

Probably the best and easiest way to support the casting is by cleating to the bench as shown in the figure. If the motor is a four- or six-cylinder block-cast type, use three sets of cleats on each side. These consist of a block of wood laid against the side of the cylinder block and clamped in place by wooden pieces mitered off at a 45 degree angle, the mitered edges of one end nailed to the block and the mitered edges of the other end nailed to the work bench. This cleating will support the block substantially.

Before proceeding with the work one must determine that the old piston to be used is the proper fit in the cylinder for the job at hand. It must not be a tight fit, one which requires considerable pressure to move it up and down. On the other hand a real sloppy fit is going to mean uneven grinding and a great deal more work to get the proper lapped surface.

The piston should have a connecting rod fitted into it, or better still a rod of such a length that it will protrude about 18 in. above the top of the piston. If one contemplates an extensive business in cylinder lapping by the hand method it would be well to fit up a number of standard-sized pistons with rods such as described above. The connecting rod itself, however, will serve well if the jobs are so few that they do not merit the special tools.



Showing method of cleating cylinder block to a work bench for lapping of cylinders and method of holding rod and old piston in the lapping process

With the cylinders blocked up on the work bench and a suitable piston at hand one is ready for the lapping operation. There are several pastes on the market made up of fine emery and an oil body which are excellent for lapping work. However, one can make the necessary material himself with very fine emery dust and ordinary motor oil, with a bit of graphite worked into the paste. This compound should be made up to the consistency of mucilage and applied to the walls of the cylinder to be lapped and to the surface of the piston to be used for the lapping.

Applying the Paste

When applying the paste watch the surface upon which it is being applied with great care, especially if the paste has been made up previously and allowed to stand around the shop for some time. It is very easy for metal chips and filings to be dropped into the paste, and if these get into the cylinders when the lapping operation is under way they are liable to scratch the surface.

Lower the piston into the cylinder and proceed with the lapping. In performing this, lower and raise the piston, at the same time maintaining a circular motion. In other words oscillate it up and down into the cylinder. Turn the piston around occasionally so that all the surfaces will be brought to bear.

This operation should be continued for

a period from 15 to 30 minutes depending on the condition of the cylinder interior. It will not remove scratches and scores and will not iron out a warped or egg-shaped cylinder, but it will dress down the small humps and impart a very smooth, glass-like finish to the cylinder walls. Repeat the operations to each of the other cylinders.

If the repair shop is equipped with a fair-sized drill press, lapping can be performed quickly on this machine. It is especially easy when one has to deal with separate cast cylinders inasmuch as these can be clamped into the drill-press bed without need of special supports. However, if the job is a block cylinder casting, one must provide some means of support outside of the drill-press bed and inasmuch as it is a matter of blocking from the floor, it is for the ingenuity of the repairman to devise the best method.

In drill-press lapping of cylinders it is, of course, necessary that a rod be used to take the place of the connecting rod, this rod to fasten to the wrist pin at one end and be so shaped as to lock into the chuck of the drill press at the other end.

Drill Press Lapping

It is well to cut a block of wood which, when dropped into the inverted cylinder will come up to the line which marks the top of the piston stroke. To lap the cylinder, the old piston is coated with the lapping paste as previously described and let down into the cylinder. The drill press must be operated at its lowest possible speed. When the lapping is going on the drill press arm should be let up and down so that the position of the piston is constantly changing within the cylinder. Of course, the lapping can be accomplished in about half the time with this method that it can be with the hand method.

At the completion of hand or machine lapping the cylinder interior should be thoroughly washed out with gasoline and the inner surface polished with a soft cloth. It is imperative that all emery be removed from the cylinder, as this grinding compound would undoubtedly injure the bearings or some other part of the motor after the motor was assembled and being run.

If a repair shop is equipped for cylinder reboring, the lapping process is the logical completion of a reboring job. It is now a simple matter to rebore and finish cylinders by hand with the use of a hand reboring tool and the necessary equipment to take off the rough spots by lapping the cylinder walls.

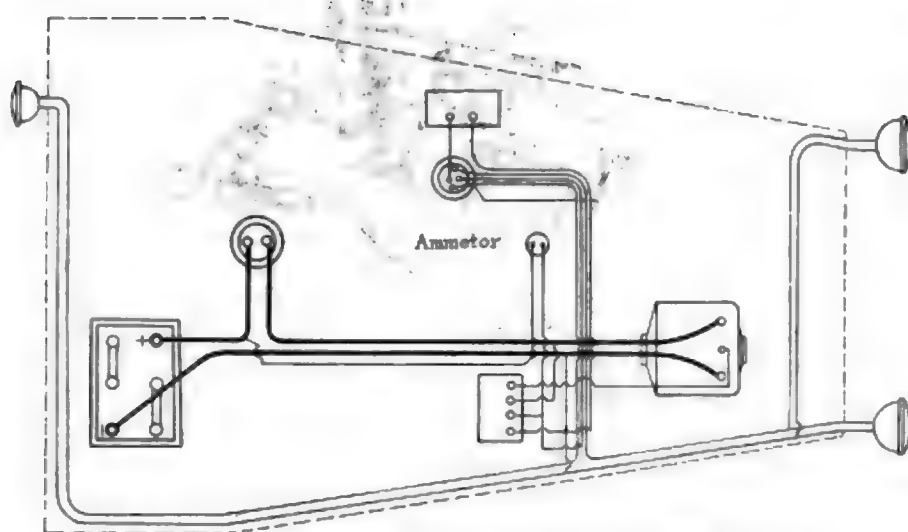


Fig. 3—Showing where ammeter should be put into circuit of Detroit system on season four

carrier locked by a plate with a projection and four cap screws; also the differential with ball bearings is adjustable either way by two ring nuts with cap screw locks. By this means, of course, it is possible to bring the pinion shaft in until the pinion and ring gear mesh, adjusting the ring gear to the correct mesh. In practice about 5/1000 back lash was given between the teeth. The cap screws for adjusting the ring gear will be found directly in front of the differential housing and those for adjusting the differential one way or the other may be got at by removing the back plate of the differential housing.

A MOTOR HANDBOOK LIKE KENT The S. A. E. Data Sheets Are Nearest to Mechanical Engineer's Book

Detroit, Mich.—Editor *MOTOR AGE*—What has become of the Porter-Knight racing cars? Are they being developed or not?

2—Why do manufacturers put the constant mesh gears, in a transmission, always at the front of the box?

3—Give the name of a hand-book for a motor car engineer, such as Kent's hand-book for the mechanical engineer.—Ben Parsons.

1—What has become of them we know not. As far as we are informed they are not being developed.

2—Because this is the logical place for it; nearest where the driving force enters, thus minimizing strain.

3—Of course the best handbook is found in the data sheets of the Society of Automobile Engineers, but these are only available to members of that society. There is no other book of a nature corresponding with Kent.

OPERATING PRINCIPLE OF METER Previously Used Delco Instrument De- scribed and Shown in Section

Minneapolis, Minn.—Editor *MOTOR AGE*—Publish a diagram of the internal arrangement, connections, etc., of the ampere hour meter which was used by the Delco starting and lighting system during 1913 on the Oakland and some few other cars. This device was made and the patents controlled by the Sangamo Meter Co., of Sangamo, Ill.

I and, perhaps, thousands of other mechanics and electricians understand what the device is supposed to do and how to take care of it. The point in question is, what is the principle involved in the driving of the meter? It is

not a meter such as is used in ordinary electrical practice.—W. H. Hunt.

This meter is what is known as the mercury-motor type and consists of a thin copper disk rotating in a horizontal plain in a pool or bath of mercury, through which current passes. The repulsion between the lines of force produced by the passing of current through the disk and the lines of force of a set of permanent magnets, which also provide the necessary brake for the disk, causes the meter to revolve at a speed roughly proportional to the current passing through it. On these meters it was found desirable to compensate for the difference in efficiency in the storage battery when charging and discharging, and what is known as the compensating pole with a coil around it was added to the meter so as to make the recording instrument operate more slowly when indicating charge than when indicating discharge. A section of this meter is shown in Fig. 4.

HINTS ON SECOND-HAND BUYING Major Things to Look for When Selecting Used Car

Mason City, Ia.—Editor *MOTOR AGE*—What kind of an examination would *MOTOR AGE* suggest giving a second-hand car before buying it? I have never owned a car, but have been reading *MOTOR AGE* for several years.—R. E. Patterson.

See the answer to A. C. McGrady's inquiry, published on these pages. In addition to this we would suggest that you try to wobble the wheels by pushing back and forth on the top surface. If there is a looseness the wheel bearings are worn or need tightening. If the car is electrically equipped, examine the storage battery carefully. If the case is rotted out and there are green deposits in evidence, something is leaking and the battery may be practically worthless.

Have the starter operated several times and make sure that it turns the motor over vigorously. Examine all wiring you can see, looking for worn or shredded insulation.

If there are any cuts in the tires pry

these apart and see how deep they are. If they are down to the fabric or have scratched the fabric, the tire is not going to be very long lived. Examine the casing where it enters the rim. If there is evidence of rust you can be quite sure that this rust continues inside and the tire is probably rotted and rim cut or well prepared to rim-cut when any driving is done.

Have all wheels revolved rapidly when on a jack and look for wobble. A waving wheel is indeed hard on tires and bearings.

Look for leaks in the gasoline tank and gasoline piping.

CRITICIZES OUR FISH PICTURE Says Photograph Depicts Wanton Slaught- er of Water Dwellers

Hutchinson, Kan.—Editor *MOTOR AGE*—I want to criticize you for inserting such an unsportsmanlike picture as you show on page 8 of Dec. 14, 1916 issue, where three or four hundred fish are shown.

No true sportsman would slaughter the funny tribe in that manner and it is certainly offensive to our sense of humor to see a picture like this in *MOTOR AGE*.

The rest of the article and pictures are fine and I enjoyed it very much. I love to fish and hunt, and that may be the reason why I am against wanton killing of any wild game.

A hundred and fifty years ago the American Indian might have been excused if he could have had a camera and taken a picture of three or four hundred scalps taken from the heads of his enemies and published and sent broadcast over the world. But fish are not our enemies. Please print this, and see if it does not meet the approval of your readers.—H. G. Welsh.

Ford Speedsters Illustrated

Yokum, Tex.—Editor *MOTOR AGE*—I want to make a classy little speedster or racer out of a Ford. Kindly publish a design for an attractive body, and would appreciate any suggestions you might have to offer. How about electrical equipment?—E. H. Wehmann.

MOTOR AGE is and has been for a number of weeks publishing photographs and descriptions of rebuilt Fords. These have been built over by *MOTOR AGE* readers. We suggest that you study them for the ideas which might best strike your fancy. In a few weeks a summary of all these is going to be published in what app? to us to be the ideal rebuilt Ford. A assortment of ideas gives you a large of options than we could suggest to you.

Internal-Gear Drive

Dallas, Tex.—Editor *MOTOR AGE*—What is the advantage in using flat springs or inverted springs as on the Republic truck, and is this strictly in accord with the best engineering principles?

2—What are the advantages and disadvantages of the internal gear drive for commercial cars?—A. Mills Cameron.

1—This is a good engineering principle. The construction gives a very solid spring support and semi-elliptic design is particularly good for trucks because of its strength.

2—Internal gear drive has as its talking points a positive spur gear drive to take the gear reduction instead of a bevel

reduction, and the possibility of using a dead axle to carry the heavy loads to which a truck is subjected. It may be readily seen that, inasmuch as the drive shaft to the wheel turns much faster in an internal-gear drive than in a bevel or worm drive, this drive shaft will have less load upon it—the twisting strain will not be as great.

COUNTERBALANCING FORD CRANKS Rear Axle May Be Made Stronger With Truss Rod

East Orange, N. J.—Editor MOTOR AGE—Would counterbalancing a Ford crankshaft be as practical and increase the power as much in proportion to size of motor as that of a Hudson Super-Six, provided valve areas were larger, motor equipped with overhead sixteen-valve attachment, and flywheel magnets removed?

2—Describe a little more fully on H. J. Lead's miniature Ford racer published in issue of Oct. 28, 1916, the spring suspension, extras on motor, gear ratio and half-mile track records.

3—Those who have raced Fords have had trouble with rear axles breaking on half-mile track work. Do you know any preventative outside of keeping as much weight off the rear as possible?

4—My Ford is standard tread and regular wheelbase with original spring suspension, Bosch and Rayfield equipped as well as Hook wire wheels, M. P. S. differential, 2% to 1 gears in the rear, aluminum pistons and special water and oiling systems and braced well both front and rear. I can do 70 m.p.h. straightaway, but cannot get the speed I ought to on half-mile tracks. Do you think it wise to narrow and shorten my car? Would this spoil it for speedway work if we should have any here in the east?—Roland C. Gifford.

1—Yes.

2—MOTOR AGE published all information given by Mr. Lead.

3—Put a truss rod under the rear axle. These are manufactured by a number of different makers and are available at any completely equipped supply house which specializes in Ford attachments.

4—A shorter wheelbase would be better both for dirt tracks and speedways. You will gain nothing by narrowing the tread.

SOMETHING ABOUT STEAM CARS Previous Faults Have Been Swept Away and New Cars Are Efficient

Los Angeles, Cal.—Editor MOTOR AGE—There seems to be a revival of interest in the steam car, and I would like the opinion of MOTOR AGE as to the future of the steam car. I have been a gas car enthusiast for 15 yrs. but recently had a ride in a Stanley steamer and have no doubt but that it can perform better than any gas car I have ever ridden in. What is wrong with the steam car? What are its limitations?

2—How long will the boiler or generator last?

3—Is the Doble generator an improvement? Are they cheaper to run and maintain? Have the automatic regulators on water been perfected so that they do not bother?—Eugene Ballou.

4—The perfected Stanley steam car has everything to its credit. Its limitations are no greater than those of the gas car and possibly not as great. The previous steamer faults, difficulty in firing up, delicacy of parts which were liable to cause trouble and frequent renewal of water supply, have been done away with in the new Stanley cars.

2—As long as the car, if properly cared for.

3—It is surely an improvement over the generators of a few years ago, if that is what you mean. This generator is very efficient.

4—For their weight and power they are cheaper to run than the ordinary gas car. With kerosene as a fuel one of the new types of steamers can maintain an average of 10 to 12 miles per gal.

Maxwell Bearing Renewal

Fayette, La.—Editor MOTOR AGE—Explain how to put in a new front magneto gear shaft bearing in a Maxwell 25, 1915 model.—A Subscriber.

Drain the water from the entire cooling system. Loosen the hose connections between the motor and the radiator, and remove from the chassis the radiator together with the front dust shield. Next, loosen the two bolts which hold the rear motor supports to the motor support

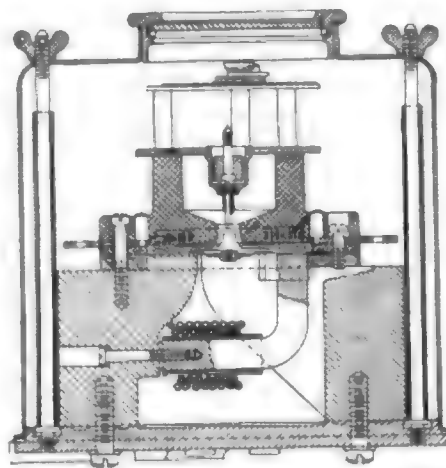


Fig. 4—Section through ampere hour meter used in old Delco equipment

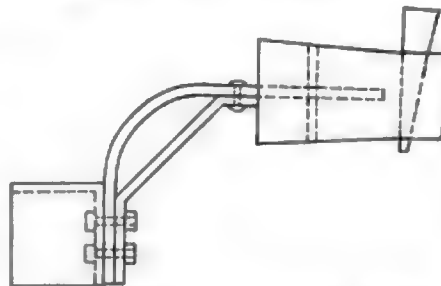


Fig. 5—Suggested home-made bracket for carrying extra wire wheel on rear of car

brackets which are riveted to the chassis frame, and remove the cap of the trunnion support from the front of the engine.

Raise and block up the front of the motor so that it is possible to remove the fan-driving pulley and the front gearcase cover which holds the magneto gear shaft front gearing. The old bearing can then be pressed from the gear case cover and the new one pressed into place. If necessary the bearing should be scraped or otherwise fitted to the shaft. In assembling, the order of work should be the reverse to that outlined above.

Cord Tires Best

San Francisco, Cal.—Editor MOTOR AGE—Which would be the best tire equipment on a Model D 6-45 Buick touring car, having 34x4 wheels, 34x4 cords, 34x4 fabric, 35x4 1/2 fabric? This is from the standpoint of economy, both tire and gas.

2—Which would be the best from the standpoint of speed?

3—From the standpoint of flexibility in hill climbing?

4—From the standpoint of comfort, easy riding, absence of tire troubles?

5—From an all-around view of the problem? This car is used 75 per cent of the time touring on the best and worst of roads at speeds up to 40 m.p.h.

6—Is a set of oversize much heavier than the regular size casings?—G. N. Loeb.

1-2-3-4-5—The 84 by 4 cords.

6—About 10 per cent.

TESTS WHEN BUYING USED CAR Things to Look for in Motor and Gearset of Old Machine

Buckhorn, Wyo.—Editor MOTOR AGE—I have just sold my old Cadillac, but expect soon to buy another car. I cannot afford a new car, so thought I would buy a used one. Outline a few simple tests for determining the condition of the power plant and the gearset in a motor car when inspecting with the intention of buying—that is, tests that would determine the condition of the vital parts one is unable to see.—A. C. McCrady.

Ask that the motor be run and then listen very carefully for noises that sound like loose bearings or other misfitting parts. Have them open the throttle quickly with the spark well advanced. If the motor sounds as if it were knocking there is probably something loose.

Grasp the valve push rods where they come out of the valve lifter assembly. If they move about loosely the guides are worn. Look to the adjustment of the valves. If they are loose ask that they be tightened and you may find that they are already adjusted to the limit, or that there is no adjustment and new parts are needed.

When the motor is running examine the gaskets about the cylinder and carburetor very carefully for a leak.

Listen for noise in the timing gears. If it is excessive the teeth may be worn or broken.

Put a puddle of water into each spark plug pocket and determine whether there is a leak around the plugs. If there is, find out whether it is just a faulty gasket on the plug or whether the threads in the cylinder are stripped.

Have the rear wheels jacked and the floor boards removed. Have the gears shifted or do it yourself with the motor running slow and then fast. Determine whether the gears shift readily or whether they grind before engaging. Grasp the propeller shaft directly behind the gear-box and attempt to move it backward and forward. If there is any play to speak of the bearings within the gearset are worn.

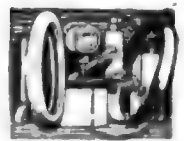
Ammeter on Saxon Four

Iowa City, Ia.—Editor MOTOR AGE—I have a Saxon four, model 14, which is equipped with a single-unit Detroit starting and lighting system less an ammeter. I have an Ever Ready ammeter and would like to know what are the necessary connections to show when the generator is charging the battery and also what the discharge is.—Kindly illustrate by diagram.—C. H. Jackson.

The wiring diagram in Fig. 3 shows where the ammeter should be cut into the circuit on this system. Connect the two outside wires on your ammeter.



The Accessory Corner



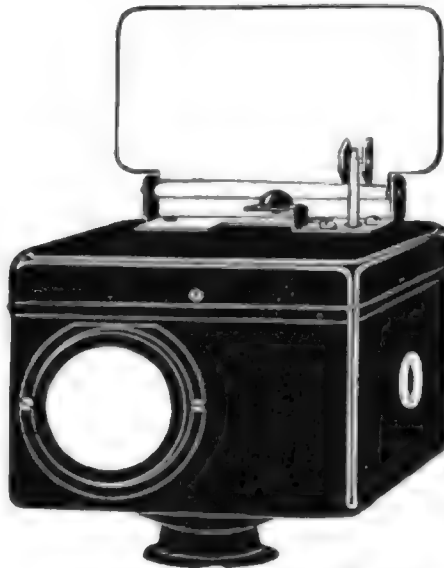
Gear-shifting lock for all cars with ball control levers

Compact Folding Tent

A COMPLETE and compact camping outfit available in sizes for all standard makes of machines is a product of the Genesee Mfg. Co., Flint, Mich. There is a 6-ft. clearance inside and a 4-ft. side wall under which one may sit comfortably in a chair. The maximum height of the tent at the side of the car is 7 ft. These tents attach directly under the side quarters of the top by means of grommets, which fit over the fasteners used on the tops for attaching side curtains. The tent is made of khaki shelter duck. Four stakes are all that is necessary to make this tent rigid. There is a bed having a helical spring end which is attached by means of web straps. It is equipped with snaps and take-up buckles and stretches from the top of the rear seat up to the steering wheel, making the bed 6 ft. long and 42 in. wide. The entire equipment can be conveniently packed in a rubber sack and carried on the running board. The price of the tent is \$17.50 and that of the bed, \$7.50.

Keystone Rubber Products

No-cement patches, vulcanizing fluid, reliners, blow-out patches, cut weld, boots, rubber cement, and army duck patches are listed among the new products of the Keystone Rubber Mfg. Co., Erie, Pa. The no-cement patches are packed in flat manila envelopes or in cans so that they may be carried handily in pockets or under cushions. The packages or cans contain twelve patches of three sizes with emery paper and cleaning cloth. A few drops of gasoline is all that is necessary outside of this equipment to apply a patch, although the Keystone vulcanizing fluid is made especially for this purpose and has its advan-



Signal device with red light for night and red sheet of metal for day



Comer safety signal, the invention of a railroad conductor

tage inasmuch as it is non-inflammable and affords a quicker and better application. The blow-out patch, as pictured, is made to take care of any possible trouble arising from all classes of blowouts.

Electric Signal Device

An electrical signal device to warn vehicles following that the driver is going to stop his car or make a turn is being put on the market by a new Denver concern. There is no complicated code to indicate what particular move the car carrying the signal is going to make, but a red light and a red sheet of metal serving as a flag, furnish a clear warning to traffic. The device is a pressed-steel box with a red lens in the rear side and metal flag on top. The box is 3 in. wide by 4 in. long and 3½ in. high and the raised flag adds another 3 in. in height. The solenoid operating the flag is connected with a button on the steering wheel, and the same circuit simultaneously lights the 4 cp. lamp in the box, thus making the lamp useful day and night.

Current from the storage battery operates the signal. The price is \$5 complete. Denver Traffic Signal & Mfg. Co., Denver, Colo.

Regulator for Headlights

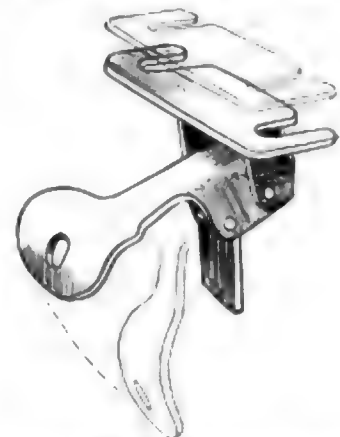
The Perrin Ford headlight regulator concentrates the light when the car is running under 10 miles an hour and the lighting current from the magneto is inadequate. When a Perrin-equipped car slows down, all available current goes automatically to the right hand lamp. When higher speed is resumed, the other lamp takes its normal share of the current, still automatically. The regulator can be installed in 5 min. with a monkey wrench and without change in the car's wiring or boring holes. The price is \$1. Perrin Mfg. Co., Detroit.

Comer Safety Signal

The Comer Auto-Stop signal is the invention of a railroad conductor after whose name it is being marketed by the Auto Signal Co., Chicago. It is attached to the tail light and license number bracket in the rear of the car and operates coincident with the working of the car's brake. Thus, whenever the driver presses his brake to slow down a semaphore appears from behind the license number flashing the word, stop. In daylight the word stop appears in white letters in a red metal board. At night the letters, which are made of opaque celluloid, are lighted from within by an electric light. It sells for \$12.50.

Foldable-Drain Top

A top provided with foldable drains or troughs which carry the water to the rear of the car and prevent it dripping or flowing over the edges of the top onto passengers in the car on entering or leaving, is a product of the D. G. Saunders, Jr., Saunders & Co., Kansas City, Mo. The con-



Device to compress Ford valve springs to facilitate removal of valves



From the Four Winds

GASOLINE From Gas Maybe—The Utah-Wyoming Consolidated Oil Co. plans to spend half a million dollars on experiments on making gasoline and carbon black from natural gas. The company controls the largest gas well in Big Horn, Utah, basin.

Motor Robe Duty May Increase—The board of appraisers has ruled that motor car robes are not blankets and cannot be admitted as imports at the same rates. Unless the United States court of customs appeals overrules this decision the duty on motor robes will be increased.

Richmond Show Date—Richmond, Va.'s, first annual motor car show will be held in Richmond Gray's Armory Jan. 27-Feb. 2. The date is subject to change if armory is needed for mustering out regiment now on border, which does not seem probable at this time.

Dixie Highway Travel—In spite of the reported general ill condition of the Dixie highway, 100 foreign tourist motor cars travel up and down the highway daily when it is open to traffic. It is reported from Chattanooga. More than 100 a day entered Jacksonville over this route during December. Still others entered Florida through Tallahassee, Monticello, Live Oak and Lake City.

Madison Dealers' Show—The Madison, Wis., Automobile Dealers' Association selected Jan. 24-26 as the dates of the sixth annual motor show. Before this year the show has consisted of private exhibits in all salesrooms in the city. Visitors were transported from one to the other free of charge by the respective dealers. This will be the first time that the show has been held under one roof.

Flint, Mich., to Have Show—Flint, Mich., show dates have been set at Feb. 21-24. Most of the dealers have contracted for space already. The new coliseum does away with the old problem of place in which to hold a show, and present plans are for at least eighty models at that time. One-third of the receipts will be given to charity. E. W. Jeffers of the Chevrolet Motor Co. has charge of arrangements.

Show During Inaugural Week—Washington, D. C., dealers will show during inaugural week. The exhibition will be under the auspices of the Middle Atlantic Motor Association, Inc. As so many visitors will be at the capital at that time it is expected that all the 35,000 sq. ft. of available space will be taken readily. Commercial cars will be included in the displays.

International Motor Club Home—Motorists who visit New York soon may have a new place to stop in that city. The International Motor Club is now the owner of a five-story residence on Riverside drive, which is for a clubhouse and the headquarters of the International Motor Clubs' Association in New York. Members of the International Motor Club in other cities will have the privileges of the new club without extra cost.

Jersey's Reciprocity Real—While New Jersey motorists had to start out with 1917 licenses Jan. 1, the strangers within her gates were given full reciprocity by the New Jersey motor vehicle department. Pennsylvania's department has been troubled with a shortage of tags and on this account extended its time limit to Jan. 15. New Jersey promptly extended the same courtesy to Pennsylvanians within her borders. Several arrests have been made for failure to carry 1917 tags, but all citizens of other states which

for any reason did not make their license changes mandatory on the same date as New Jersey did were promptly discharged from custody.

Jersey Squire Who Annoyed Motorists Indicted—Squire Joseph F. Weeks, Pleasantville, N. J., who, it is charged, reaped a harvest in fines imposed on motorists who paid to avoid publicity and delay, but who later preferred charges with the state motor vehicle department, has been indicted by the

Atlantic county grand jury on thirteen counts, charging extortion and malfeasance in office. Squire Weeks was the nemesis of those who went in and out of Atlantic City and is one of the best known justices in the states.

To Urge Interstate Motor Law—Representative W. C. Adamson of Georgia—yes, the author of the 3-hr. railroad law—has drafted a bill which he will introduce at this session of Congress on the problem of interstate touring. The object is to get an interstate motor car law.

Old Trails to Be Improved—Deeds for strips of land through two Montgomery county, Missouri, farms make possible the changing of the Old Trail road between St. Louis and Kansas City so that the worst part, which is known as the Mineola Hills, will be eliminated. Work is to begin soon on the improvement.

Show to Honor Washington—When Duluth, Minn., holds its third annual motor car show during the week of Washington's birthday, the armory will be decorated in the national colors in honor of the first president. Present indications are that 125 cars will be shown, thirty-five more than last year. Motor trucks and accessories also will be displayed.

Los Angeles Cars Stolen, Too—New Year's eve motor car thieves stole nineteen cars in Los Angeles. Twelve were taken from in front of the Los Angeles Athletic Club, while two special watchmen were on guard. According to onlookers, who made reports to the authorities, the thieves made no special effort to conceal their work, but told those who questioned them that they had been sent from the garage to get the cars and keep them until the owners called. Later, three of the cars were found abandoned along suburban roads.

Joliet, Ill., Opposes Wheel Tax—Citizens of Joliet, Ill., filed their first referendum remonstrance, protesting against the new wheel tax ordinance recently adopted. There were 1,900 names signed, of which one-third were of women, and 400 names more than the legal requirements. The protest automatically stays the ordinance which was to have taken effect Jan. 1. The council has 30 days in which to take action. The law provides that unless the ordinance is repealed, it must be sent to a referendum vote of the people at a special or general election.

Los Angeles Tries New Plan—It is claimed that the system in vogue in Los Angeles has made it too easy for accused violators of the motor vehicle laws to "fix it," and the county supervisors have transferred the motorcycle division of the sheriff's office to their supervision. This means that instead of appealing to the officer, sheriff or court hereafter, the accused must appear before the entire board of supervisors at a public hearing and explain why he should not be fined. The motorcycle division has control outside of incorporated cities on the county highways only.

High Standards Set For Road Construction—Under the proposed laws that the New Jersey legislature expects to put through this winter, a high standard of road construction will be set up and each county will be compelled to build according to this standard if it gets any road money from the state. The new laws, which will be enacted at the earliest possible moment, will provide for a reorganization of the road department and a special tax for road funds. These laws are a part of the economy and efficiency program of the new state administration.

Coming Motor Events

RACES —1917—

May 19—Metropolitan Trophy, New York speedway.
 †May 30—Indianapolis speedway.
 †June 9—Chicago speedway.
 June 23—Cincinnati speedway.
 †July 4—Omaha speedway.
 †July 14—Des Moines speedway.
 †July 28—Tacoma speedway.
 August 4—Kansas City speedway.
 †September 3—Cincinnati speedway.
 †September 15—Providence speedway.
 †September 25—New York speedway.
 October 6—Kansas City speedway.
 October 13—Chicago speedway.
 October 27—New York speedway.

1A. A. A. championship events for 1917.

SHOWS

January 19-24—Manchester, N. H., show.
 January 20-27—Detroit show.
 January 20-27—Montreal, Can., show.
 January 22-27—Oklahoma City show.
 January 22-27—Rochester, N. Y., show.
 January 23-27—Allentown, Pa., show.
 January 23-27—Baltimore show.
 January 25-27—Asheville, N. C., show.
 January 27-February 3—Chicago show.
 January 27-February 3—Columbus, Ohio, show.
 January 27-February 3—Richmond, Va., show.
 January 27-February 3—Portland, Ore., show.
 January 27-February 5—York, Pa., show.
 January 28-February 3—Wilmington, Del., show.
 January 29-February 3—Buffalo show.
 February 3-10—Minneapolis show.
 February 5-10—Bangor, Me., show.
 February 10-17—San Francisco show.
 February 10-17—Hartford, Conn., show.
 February 12-17—Kansas City show.
 February 12-17—Louisville, Ky., show.
 February 13-16—Grand Forks, N. D., show.
 February 13-16—Fargo, N. D., show.
 February 13-17—Sioux City, Ia., show.
 February 14-17—Peoria, Ill., show.
 February 19—Pittsfield, Mass., show.
 February 19-24—Bridgeport, Conn., show.
 February 19-24—Des Moines, Ia., show.
 February 19-24—Duluth, Minn., show.
 February 19-24—Grand Rapids, Mich., show.
 February 19-24—St. Louis show.
 February 19-24—Syracuse show.
 February 21-24—Flint, Mich., show.
 February 24-March 4—Atlanta, Ga., show.
 February 26-March 3—Omaha, Neb., show.
 February 26-March 3—Great Falls, Mont., show.
 February 28-March 3—Utica, N. Y., show.
 March 1-3—Urbana, Mich., show.
 March 3-10—Boston show.
 March 3-10—Washington, D. C., show.
 March 6-10—Fort Dodge, Ia., show.
 March 7-10—St. Joseph, Mo., show.
 March 14-17—Davenport, Ia., show.
 March 14-17—Mason City, Ia., show.
 March 18-23—Cedar Rapids, Ia., show.
 April 4-7—Stockton, Cal., show.









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ANNOUNCEMENT

In the next issue of Motor Age will be a complete re-
port of the Chicago show, taking up the new features
which will be seen for the first time by the public.
There will be a number of sub-specials having to do
with refinements developed in the last year in the in-
dustry as exemplified at the exhibition in the Western
metropolis.

"NORMA" BALL BEARINGS

(PATENTED)

As determining the capacity of a car or truck
for rendering high-class service, no single item,
however small, can be considered of minor im-
portance. For instance, a broken or sluggish
or inefficient bearing in magneto or lighting
generator or starting motor will so cripple
these accessories as to destroy their functions
in the unit performance by which the car or
truck will be measured.

All the higher-grade magnetos, light-
ing generators and starting motors are
built in the full knowledge of the re-
sponsibility they must bear in the total
performance. Which explains why
they are, almost without exception,
fitted with **NORMA** Bearings of
proved speedability and serviceability.

See That Your Elec-
trical Accessories Are
"**NORMA**" Equipped.



THE NORMA COMPANY OF AMERICA

1750 BROADWAY

NEW YORK

Ball, Roller, Thrust, Combination Bearings

Studebaker
Established 1852

It's Coming Your Way!

THE STUDEBAKER GOLD CAR

AT the New York Show, where it was exhibited for the first time, it created even more interest than the famous Gold Chassis of a year ago. It is not the Gold Chassis of last year, but an entirely new Series 18 chassis, equipped with a new Series 18 body. It is mechanically complete and can be operated.

This greatest of all Show features will be exhibited at the Shows in the following cities:

**CHICAGO, ILL.
KANSAS CITY, MO.
OMAHA, NEB.
MINNEAPOLIS, MINN.
ST. LOUIS, MO.
BOSTON, MASS.
PITTSBURGH, PA.**

The full line of Series 18 Studebaker cars will also be on exhibition at each of the above Shows.

Factory representatives will be in attendance to give full information regarding the line, and details relative to any open dealer territory.

STUDEBAKER

South Bend, Ind.

Detroit, Mich.

Walkerville, Ont.

Address All Correspondence to Detroit

When Writing to Advertisers, Please Mention Motor Age



The answer rests with his majesty, the American Citizen of today. In his discomforts of today are found the accessories of tomorrow

reasoning is logical with regard to present attainments. Those far-seeing minds that have read the future were not endowed with supernatural prophecy but rather followed that logical course of reasoning from yesterday to to-morrow in the light of to-day.

Coming back to motor car accessories, you do not have to be equipped with the magical lamp of an Aladdin or with the golden touch of a Midas, but with the brain of an average citizen you should analyze your desires and likes of to-day; analyze what we have in our daily life, in our railroad trains, in our steamboats and in our homes; analyze our comforts and our discomforts and then paint on the canvas the car you want to buy in 1922, and paint on it those accessories, those conveniences, those luxuries, those whims you would like. Five years hence you can check up with your day dreams of 1917 and see how far your mind ran ahead of the average or how far the gray matter of the accessory engineer was ahead of you in painting the picture.

All Progress Comparative

All progress is comparative, and the halcyon days of ten years ago, when we revelled at the sight of green fields and flowered hillsides without windshield, without electric lights, without speedometer and without one-person tops but with dust and sun and rain and mud and punctures, can be lived again if we only keep our minds young and do not measure our age in years but in sentiments and inspirations. To-day with our improved roads, our inside storm curtains, our electric lights, our demountable wheels, our clocks, our clear-vision windshields, our exhaust heaters, our electrically heated steering wheels, our robes with

pockets for the hands, we should be as happy as saints strumming on harps on the edge of some fleecy cloud. But we are not. We want the equipment of to-morrow. We want the accessories of 1922.

We have suddenly become presidents, kings, kaisers, czars, potentates, and once seated back of the steering wheel, or warmly ensconced in the tonneau, the world is ours. We are the modern knights errant of the highway. We envy only the aviator.

Our desires are uncontrollable: For zero weather we want a heater for the front seat as well as for the tonneau and see no reason why the accessory engineer with a brain so colossal as to conceive the idea of tapping the exhaust pipe for heat cannot solve the amazingly simpler problem of a hinged heater for the front seat, that when not in use might swing into a space beneath the front cushions, there quietly to lay all summer ready to be swung out at a moment's notice when Jack Frost has taken the reins. We want all comfort for madame and the guests in the back seat, but often it gets cold in the front seat also.

We would be able to buy a new motoring suit each year for the money spent in cleaning our clothes after changing tires. Getting the jack under the front or rear axle is worse than following Descartes' logic. The car engineer never thought of having a little boss on the axle against which the jack can rest; and the accessory engineer forgot that women and sometimes mere girls have to place the jack under the dirty axle and then use the short handle to do the rest. Jack engineers want to get a new vision, unless they are fortunate enough to be in the dyeing and cleaning business or have stock in glove-making concerns. Perhaps some day we will have a jack attached

permanently to the back axle. It may be an electric jack or a pneumatic jack. Below the steering wheel will be a little electric button or maybe four buttons. Press one and up will come the right rear wheel, press any of the other three and up will come the desired wheel. What joy that day has in store! Then you can start for church with clean gloves, clean collar and clean clothes and come home the same way. It will parallel Mark Twain's experience. He was overjoyed to wire after making the trip from New York to Chicago in one of his immaculate white woollens that he had arrived with suit clean. Give us such a jack and milady will order more cars. It will not be the garage for one car at the back of the house but for two: we hope three. Those will be the halcyon days, days when the weary salesman will have something just as interesting as the self-starter or the electric lighting system of yesterday.

Such will be the days when electricity will be as general as dust was on Illinois roads in 1916. In these sunshine days of tomorrow we hope the accessory engineer will have the car fitted with electric sockets in which trouble lamps can be plugged as the well-equipped garage is to-day. If the right rear tire blows out at twelve-thirty at night when we are returning from the club, we expect there will be a socket at the center of the car, in which we can put the plug of an emergency light that will illuminate the entire wheel. We see no reason why we then will have to wriggle and strain to start the locking device on the demountable wheel or the nuts for the demountable rim. It is certain the electric wrench will be our handmaid and, presto, nuts and locking devices will fall away as ice before the warm sun. Then changing tires will be a recreation; we will not object to a puncture or so, just to demonstrate to our guest what a marvelous car we have and to prove to him what wizards of electricity we are. While father handles the wrenches and lights mother can give the children their outing lesson on elementary electricity.

Endless Use of Electricity

King Solomon assisted in making himself immortal by concluding that of making many books there was no end but were he with us today he would conclude that of using electricity there is no end; and while the exponents of air in its various forms would like a better hearing, the offspring of Ben Franklin still has the inside position and to him we are going to look for many of the entertainment marvels of tomorrow--entertainment marvels because we are almost assured that what are troubles today will be subjects of entertainment and topics for philosophizing on tomorrow.

Not so many years ago we took our cold lunches with us on the railroad journey; and our fathers in crossing the Atlantic carried enough to serve them for a month or six weeks. So today we take our cold lunches with us on our picnicking trips. We

Name and address	Space
F. I. A. T., Poughkeepsie, N. Y.	Col. L 1
Franklin, H. H., Mfg. Co., Syracuse, N. Y.	Col. A 1
Grant Motor Car Corp., Cleveland, Ohio	Col. F 1
Greer, Erwin, Automobile Co., Chicago	Greer U 4
Hal Motor Car Co., Cleveland, Ohio	Greer U 4
Harrout Motors Corp., Detroit	Arm. E 5
Hassler Motor Co., Indianapolis, Ind.	Base. 3
Haynes Automobile Co., Kokomo, Ind.	Col. C 4
Hudson Motor Car Co., Detroit	Col. B 4
Hupp Motor Car Corp., Detroit	Col. B 5
Inter-State Motor Co., Muncie, Ind.	Ann. O 1
Jackson Automobile Co., Jackson, Mich.	Ann. Q 2
Jordan Motor Car Co., Cleveland, Ohio	Arm. C 2
King Motor Car Co., Detroit	Col. B 1
Kissel Motor Car Co., Hartford, Wis.	Col. G 1
Lewis Spring & Axle Co., Chelsea, Mich.	Arm. B 4
Liberty-Howard Co., Connersville, Ind.	Arm. A 5
Lozier Motor Car Co., Detroit	Arm. C 4
McFarlan Motor Co., Connersville, Ind.	Greer 11
Malibohm Motors Co., Racine, Wis.	Arm. D 1
Maxwell Motors Co., Inc., Detroit	Base. 1
Mercer Automobile Co., Trenton, N. J.	Col. D 3
Mets Co., Waltham, Mass.	Ann. P 1
Milburn Wagon Co., Toledo, Ohio	Arm. E 3
Mitchell Motors Co., East Moline, Ill.	Arm. A 4
Moline Automobile Co., Inc., Racine, Wis.	Col. K 1
Monitor Motor Car Co., Columbus, Ohio	Arm. B 8
Monroe Motor Co., Pontiac, Mich.	Base. 14
Moore Motor Car Co., St. Louis, Mo.	Arm. C 5
Mutual Motors Co., Jackson, Mich.	Ann. N 1
	Arm. B 3

Name and address	Space
Nash Motors Co., Kenosha, Wis.	Col. B 3
National Motor Vehicle Co., Indianapolis, Ind.	Col. E 2
Nordyke & Marmon Co., Indianapolis, Ind.	Ann. M 1
Oakland Motor Car Co. of Mich., Pontiac, Mich.	Col. A 4
Ohio Electric Car Co., Toledo, Ohio	Arm. A 6
Olds Motor Works, Lansing, Mich.	Col. D 6
Packard Motor Car Co., Detroit	Col. A 2
Paige-Detroit Motor Car Co., Detroit	Col. C 2
Pan-American Motors Corp., Chicago	Greer 7
Paterson, W. A., Co., Flint, Mich.	Arm. B 2
Pathfinder Co., Indianapolis, Ind.	Arm. B 5
Peerless Motor Car Co., Cleveland, Ohio	Arm. B 7
Pierce-Arrow Motor Car Co., Buffalo, N. Y.	Col. D 4
Premier Motor Corp., Indianapolis, Ind.	Arm. B 6
Princess Motor Car Co., Detroit	Greer 8
Pullman Motor Car Co., York, Pa.	Col. F 2
Regal Motor Car Co., Detroit	Ann. Q 1
Reo Motor Car Co., Lansing, Mich.	Col. C 3
Saxon Motor Car Corp., Detroit	Col. C 6
Scripps-Booth Co., Detroit	Col. E 4
Standard Steel Car Co., Pittsburgh, Pa.	Arm. E 2
Stearns, F. B., Co., Cleveland, Ohio	Col. F 4
Stephens Motor Branch, Moline, Ill.	Base. 13
Studebaker Corp., Detroit	Col. B 2
Stutz Motor Car Co., Indianapolis, Ind.	Ann. C 2
Sun Motor Car Co., Elkhart, Ind.	Greer 2
Velle Motor Vehicle Co., Moline, Ill.	Col. A 3
Wescott-Motor Car Co., Springfield, Ohio	Arm. A 3
Willis-Overland Co., Toledo, Ohio	Col. D 1
Winton Co., Cleveland, Ohio	Col. A 5
Woods Motor Vehicle Co., Chicago	Arm. B 1

List of Accessory Exhibitors at Chicago

Name and address	Space
A-B-C Starter Co., Detroit	Ann. 2d fl.
Aceral Co. of America, New York	Base. 6a
American Bronze Co., Berwyn, Pa.	Col. Gal. 83
American Bureau of Eng., Inc., Chicago	Arm. Bal. 81
American Chauffeur Pub. Co., Cincinnati, Ohio	Arm. Bal. 40
Armstrong Cork Co., Pittsburgh, Pa.	Base. 7a
Auto Compressor Co., Wilmington, Ohio	Ann. 2d fl.
Auto Gear & Parts Co., Chicago	Arm. Bal. 18
Automobile Supply Mfg. Co., Brooklyn, N. Y.	Ann. 2d fl. 102
Badger Brass Mfg. Co., Kenosha, Wis.	Gal. 58-9
Bay State Pump Co., Boston, Mass.	Col. Gal. 5
Becker Bros., Inc., Chicago	Ann. 2d fl. 173
Benford Mfg. Co., Mt. Vernon, N. Y.	Col. Gal. 10-11
Brown-Lipe-Chapin Co., Brown-Lipe Gear Co., Syracuse, N. Y.	Col. Gal. 43
Brunner Mfg. Co., Utica, N. Y.	Ann. 2d fl. 205-208
Brunswick-Balke-Collender Co., New York	Arm. Bal. 23-24
Buda Co., Harvey, Ill.	Col. Gal. 33-34
Byrne, Kingston & Co., Kokomo, Ind.	Col. Gal. 64
Carr, F. S., Co., Boston, Mass.	Col. Gal. 16-17
Cassidy, Edw. A., Co., New York	Ann. 2d fl. 168-169
Chalmers Co., Chicago	Arm. Bal. 3
Champion Ignition Co., Flint, Mich.	Ann. 2d fl. 209
Chilton Co., Philadelphia, Pa.	Arm. Bal. 34
Clark Equipment Co., Buchanan, Mich.	Ann. 2d fl. 141-145
Class Journal Co., New York	Arm. Bal. 136-137
Continental Motors Co., Detroit	Col. Gal. 50-51
American Hardware Corp., New Britain, Conn.	Col. Gal. 98
Corcoran-Victor Co., Cincinnati, Ohio	Col. Gal. 26
Corning Glass Works, Corning, N. Y.	Ann. 2d fl. 164-165
Cowles, C. & Co., New Haven, Conn.	Col. Gal. 53
Craftmen Motor Corp., Chicago	Ann. 2d fl. 161-163
Cramp, Wm., & Sons Ship & Engine Bldg. Co., Philadelphia, Pa.	Col. Gal. 79
Curtis Pneumatic Mch. Co., St. Louis, Mo.	Arm. Bal. 11-12
Dann Products Co., Chicago	Col. Gal. 12
Detroit Battery Co., Detroit	Arm. Bal. 13
Detroit Weather Proof Body Co., Detroit	Ann. 2d fl. 149-151
Dixon, Joseph, Crucible Co., Jersey City, N. Y.	Col. Gal. 60-61
Dyneto Electric Co., Syracuse, N. Y.	Col. Gal. 97
E. A. Laboratories, Inc., Brooklyn, N. Y.	Ann. 2d fl. 197-200
Eastern Rubber Co., Philadelphia, Pa.	Base. 8b
Edison Storage Battery Co., Orange, N. J.	Col. Gal. 84
Electric Storage Battery Co., Philadelphia, Pa.	Col. Gal. 42-43
Eureka Rim Compressor, Inc., Addison, N. Y.	Arm. Bal. 19
Ferro Machine & Foundry Co., Cleveland, Ohio	Col. Gal. 13
Findelson & Kropf Mfg. Co., Chicago	Col. Gal. 36
Fulton Co., Knoxville, Tenn.	Arm. Bal. 16-17
Gabriel Mfg. Co., Cleveland, Ohio	Col. Gal. 40
Garford Mfg. Co., Elvira, Ohio	Col. Gal. 89
Gemco Mfg. Co., Milwaukee, Wis.	Col. Gal. 78
Globe Machine & Stamping Co., Cleveland, Ohio	Col. Gal. 2
Gould Compensating Gear Co., Redding, Cal.	Base. 10c
Gould Storage Battery Co., New York	Col. Gal. 18
Gray & Davis, Boston, Mass.	Col. Gal. 56 & 73
H. & D. Co., Goodland, Ind.	Arm. Bal. 32
Hall-Thompson Co., Hartford, Conn.	Col. Gal. 3
Halladay, L. P., Co., Stratford, Ill.	Ann. 2d fl. 104-105
Hartford, Edw. V., Inc., Jersey City, N. J.	Col. Gal. 52
Hassler, Robt. H., Indianapolis, Ind.	Ann. 2d fl. 163
Hayes Mfg. Co., Detroit	Col. Gal. 44
Hayes Wheel Co., Jackson, Mich.	Col. Gal. 80
Heinze, John O., Co., Springfield, Ohio	Ann. 2d fl. 174
Heinze Electric Co., Lowell, Mass.	Col. Gal. 74
Hill Insulating & Mfg. Corp., New York	Base. 15
Hoover Spring Co., San Francisco, Cal.	Base. 9d
Horseless Age, New York	Arm. Bal. 8
Howe Mfg. Co., Chicago	Base. 2b
Howell, W. H., Co., Geneva, Ill.	Base. 11b
Humboldt Machine & Stamping Co., Long Island City, N. Y.	Base. 81
Imperial Brass Mfg. Co., Chicago	Col. Gal. 90-91
Improved Gauge Mfg. Co., Syracuse, N. Y.	Base. 10a
Inland Machine Works, St. Louis, Mo.	Base. 8a
Interstate Electric Co., New Orleans, La.	Base. 11d
J. H. Tonnear Shield Co., New York	Arm. Bal. 1-2
K-W Ignition Co., Cleveland, Ohio	Ann. 2d fl. 100
Kellogg Mfg. Co., Rochester, N. Y.	Base. 19b
Kemco Electric Mfg. Co., Cleveland, Ohio	Col. Gal. 14 & 24
Kent-Atwater Mfg. Works, Philadelphia	Col. Gal. 46-47
Klaxon Co., Newark, N. J.	Col. Gal. 64
Kokomo Electric Co., Kokomo, Ind.	Arm. Bal. 25
Lane Bros. Co., Poughkeepsie, N. Y.	

Name and address	Space
Lawrence, L. & Co., Newark, N. J.	Base. 9a
Learner Tire Goods Co., Niagara Falls, N. Y.	Col. Gal. 95
Leese-Neville Co., Cleveland, Ohio	Ann. 2d fl. 201 & 204
Lipman Air Appliance Co., Beloit, Wis.	Ann. 2d fl. 157 & 160
Lumen Hearing Co., Buffalo, N. Y.	Col. Gal. 6-7
Motor & Accessory Mfrs. Office	Col. Gal. 77
McQuay-Norris Mfg. Co., St. Louis, Mo.	Arm. Bal. 9-10
Mann, F. W., Co., Milford, Conn.	Ann. 2d fl. 164-167
Marvel Accessories Mfg. Co., Cleveland, Ohio	Base. 6c
Master Carburetor Corp., Detroit	Ann. 2d fl. 123-124
Master Spark Co., Chicago	Base. 10d
Metal Stamping Co., Long Island City, N. Y.	Arm. Bal. 22
Mosler, A. R., & Co., Mt. Vernon, N. Y.	Col. Gal. 88
Moto-Meter Co., Inc., Long Island City, N. Y.	Ann. 2d fl. 101
Motor, New York	Arm. Bal. 29
Motor Vehicle Pub. Co., New York	Arm. Bal. 7
New Era Spring & Specialty Co., Detroit, Mich.	Base. 12c & d
New York Col. Co., New York	Ann. 2d fl. 190-192
North East Electric Co., Rochester, N. Y.	Col. Gal. 94-96
Oakes Co., Indianapolis, Ind.	Ann. 2d fl. 108
Otis Elevator Co., New York	Ann. 2d fl. 193-196
Pantawote Co., New York	Ann. 2d fl. 131-140
Parker Rust Proof, Co. of America, Detroit	Base. 11c
Parry Mfg. Co., Indianapolis, Ind.	Ann. 2d fl. 179-189
Perfection Spring Service Co., Cleveland, Ohio	Ann. 2d fl. 175
Picard, A. J., & Co., Inc., New York	Base. 12a & b
Piel, G. Co., Long Island City, N. Y.	Ann. 2d fl. 170-172
Pouval-Muth Corp., Poughkeepsie, N. Y.	Base. 18a
Pratt, Wm. E., Mfg. Co., Chicago	Base. 9c
Prest-O-Lite Co., Indianapolis, Ind.	Col. Gal. 21, 22, 31 & 32
Raybestos Co., Bridgeport, Conn.	Col. Gal. 75
Reliable Auto-Heater Co., Cleveland, Ohio	Arm. Bal. 15
Remy Electric Co., Anderson, Ind.	Col. 27-29
Rubber Insulated Metals Corp., Plainfield, N. J.	Ann. 2d fl. 213
Sager, J. H., Co., Rochester, N. Y.	Col. Gal. 41
Schleif, W. A., Mfg. Co., Inc., Syracuse, N. Y.	Base. 2a
Schneider's, A. Son, Inc., Brooklyn, N. Y.	Col. Gal. 35
Schwartzkopf, E. E., Detroit	Arm. Bal. 30
Sexton Co., Chicago	Col. Gal. 3-4
Shakespeare Co., Kalamazoo, Mich.	Col. Gal. 37-38
Shaler, C. A., Co., Waukegan, Wis.	Arm. Bal. 38
Simmons Metal Goods Co., Detroit	Col. Gal. 9
Simmons Magneto Co., East Orange, N. J.	Col. Gal. 76
Smith Wheel, Inc., Syracuse, N. Y.	Ann. 2d fl. 125-130
Sparks-Withington Co., Jackson, Mich.	Col. Gal. 58 & 59, 70 & 71
Splitdorf Electrical Co., Newark, N. J.	Arm. Bal. 4
Spray Primer Co., Boston, Mass.	Col. Gal. 62-63, 66-67
Springfield Body Co., Springfield, Mass.	Col. Gal. 23
Standard Parts Co., Chicago	Base. 9b
Sternberg & Co., New York	Base. 7b
Stewart-Warner Speedometer Corp., Chicago	Ann. 2d fl. 109-122
Stromberg Motor Devices Co., Chicago	Col. Gal. 57 & 72
Tobey Polish Co., Chicago	Arm. Bal. 35
Triple Action Spring Co., Chicago	Arm. Bal. 5-6
Tuthill Spring Co., Chicago	Arm. Bal. 33
United Engine & Mfg. Co., Hanover, Pa.	Base. 8b
United States Air Compressor Co., Cleveland, Ohio	Arm. Bal. 27-28
United States Gauge Co., New York	Base. 18c
U. S. Light & Heat Corp., Niagara Falls, N. Y.	Col. Gal. 81 & 82
Universal Motor Products Co., Indianapolis, Ind.	Col. Gal. 1
Universal Shock Eliminator, Inc., New York	Ann. 2d fl. 212
Vacuum Oil Co., New York	Col. Gal. 39-40
Van Cleef Bros., Chicago	Arm. Bal. 14
Van Sickle Co., Elgin, Ill.	Col. Gal. 19
Veeder Mfg. Co., Hartford, Conn.	Col. Gal. 55
Vesta Accumulator Co., Chicago	Col. Gal. 92
Voorhees Rubber Mfg. Co., Jersey City, N. J.	Ann. 2d fl. 106-107
Wagner-Hoyt Electric Co., New York	Ann. 2d fl. 146-148
Waller-Adams Co., Chicago	Base. 10b
Walker Mfg. Co., Racine, Wis.	Ann. 2d fl. 152-156
Waltham Watch Co., Waltham, Mass.	Col. Gal. 54
Warner Gear Co., Muncie, Ind.	Col. Gal. 45
Waukesha Motor Co., Waukesha, Wis.	Col. Gal. 93
Weaver Mfg. Co., Springfield, Ill.	Base. 8c
West Steel Casting Co., Cleveland, Ohio	Arm. Bal. 21
Westinghouse Electric & Mfg. Co., Pittsburgh, Pa.	Col. Gal. 85-87
Wheeler-Schleier Carburetor Co., Indianapolis, Ind.	Col. Gal. 30
Willard Storage Battery Co., Cleveland, Ohio	Col. Gal. 15 & 25
Wilson & Co., Chicago	Col. Gal. 26
"X" Laboratories, Boston	Arm. Bal. 30

Chicago Show in Medieval and Early English Renaissance Setting

Coliseum to Be Transformed to Represent Ecclesiastic Interior of Ancient British Castle

CHICAGO, Jan. 23—Preparation of the Coliseum and its adjacent buildings for housing the seventeenth annual motor car exhibition, which opens Saturday, presents a more serious problem to Manager S. A. Miles and his associates than it has in recent years. The Allied Bazaar, which has been in progress in the mammoth structure, closed last Saturday night and almost before it came to an end a monster force of workmen invaded the building and started on the work of devastation of the booths and special decorations of the charity function. They have been working continuously in 8-hr. shifts in the transformation of the Coliseum from a street of all nations into an ancient English castle.

When the doors open to the public next Saturday for the week's exposition of motor cars and accessories, the visitor will need to exert his imagination only a trifle to visualize his surroundings as the embattled yet ecclesiastical interior of an old castle of England, according to Manager Miles.

Scheme of Decoration

The scheme of decoration will be a union of medieval and early English renaissance and the somber massiveness of the foundation for the impressive effect. The scenic setting has been designed at a cost variously estimated between \$30,000 and \$50,000 and is the achievement of a force of artists at Evergreen Park. An idea of the magnitude of the work may be gained from the statement that the initial plans for the decorations were approved last March and the work started immediately.

A novelty in the decorative idea will be mural panels of scenic art glass. Globes ornamented in art glass upon gigantic pillars will assist in the illumination and from the dome 200 art glass clusters will suspend. At the north and south ends of the Coliseum will be seen the most massive wall decorations ever designed for any exhibition. These will be significant of the growth and world-wide power of the motor industry. Other panels depict the arts and crafts which contribute to the motor car.

There will be a novel treatment of the painted flowers in the balcony facings. The prevailing tones of the decorations will be amber, green, old rose and black and the exhibitors' sections will be marked off by columns set upon bases of solid mahogany.

In the First Regiment Armory this

scheme will be followed almost to the point of duplication and there will be conform-

Jan. 27—Franklin Automobile Co.—Luncheon.
Jan. 27—Maxwell Motor Co.—Meeting at Blackstone.
Jan. 28—Maxwell Motor Co.—Meeting at Blackstone.
Jan. 29—Franklin Automobile Co.—Luncheon.
Jan. 29—Maxwell Motor Co.—Meeting at Blackstone.
Jan. 30—Maxwell Motor Co.—Meeting at Blackstone.
Jan. 30—Franklin Automobile Co.—Luncheon.
Jan. 30-31—Velle Motor Vehicle Co.—Meeting at Sherman House.
Jan. 31—Saxon Motor Car Corp.—Luncheon, 1 o'clock, Blackstone.
Jan. 31—Maxwell Motor Co.—Meeting at Blackstone.
Jan. 31—Franklin Automobile Co.—Luncheon.
Jan. 31—Mitchell Motors Corp.—Congress.
Feb. 1—Paije-Detroit Motor Car Co.—Banquet, La Salle.
Feb. 1—Franklin Automobile Co.—Luncheon.
Feb. 1—Hupp Motor Car Corp.—Luncheon, Congress.
Feb. 1—Maxwell Motor Co.—Meeting at Blackstone.
Feb. 2—Maxwell Motor Co.—Meeting at Blackstone.
Feb. 2—Franklin Automobile Co.—Luncheon.
Feb. 3—Franklin Automobile Co.—Luncheon.
Feb. 3—Maxwell Motor Co.—Meeting at Blackstone.
Jan. 31—Klaxon Co.—Sales conference.
Jan. 31—Tobey Polish Co.—Dinner, Congress, 6:30 P. M.
Jan. 31—Maxter Truck and Tractor Co.—Dinner at Chicago Athletic Assn.
Jan. 31—Mitchell Motors Co.—Luncheon at Congress.
Jan. 31—Cole Motor Car Co.—Dinner Congress.
Jan. 31—Lexington Howard Co.—Meeting, Blackstone.
Feb. 1—Rich Tool Co.—Dinner, La Salle.

ity in the decorations of the Coliseum Annex and the Greer building.

Ninety-six motor car manufacturers will exhibit their products. This is one greater than the number at New York two weeks ago. There will be 165 exhibitors of accessories, making a total of 261 distinct displays.

The Chicago exhibition always is looked upon as more of a business show than is the New York exhibition and it is anticipated that the coming show will surpass former records. Dealers are flocking to the city, hotels are full and show business already is under way.

Aside from the main attraction at the Coliseum and its three supplementary structures, there will be a number of special displays in place of or in addition to the master exhibit.

The Maxter Truck and Tractor Co. will have a special display of its new 1-ton Dependable truck and the truck-forming attachments at 1512 Wabash avenue.

The Comere Motor Truck Co., Detroit, Mich., will exhibit its trucks during the Chicago show at the dealer's salesrooms, 1718 Indiana avenue.

The Salon Show at Congress

Six-Day Exhibit to Begin Next Monday— Nine Makers to Show

CHICAGO, Jan. 23—The second Annual Automobile Salon in Chicago will be held during the week of the major exhibition. The salon will occupy the Elizabethan room of the Congress hotel from Jan. 29 to Feb. 3. The first exhibition of the kind in Chicago was held at the Auditorium last year and was such a success that it has become a fixture. There will be nine motor car exhibitors and an individual exhibit of body work.

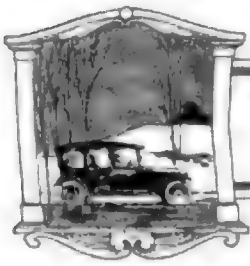
Two cars will make their debut at the Salon, the Disbrow—Louis Disbrow's new production—and the Fageol, an exceptionally high-grade proposition from the Pacific coast. The list of exhibitors, aside from these two and the body builders will be much the same as that at the salon at the Astor in New York two weeks ago. These are Locomobile, Brewster, White, Simplex, Murray, Daniels, Disbrow, Lancia and Fageol. C. P. Kimball & Co.'s conch-

work exhibit will include two additional makes of motor cars, Marmon and Doble. **Texas Dealers on Special**

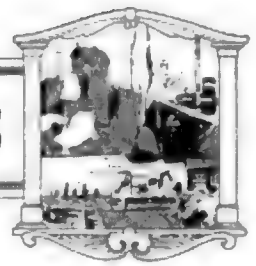
Dallas, Tex., Jan. 20—Texas motor car dealers are going to Chicago in a special train for the Chicago Automobile Show. This announcement was made in Dallas today. The train will leave San Antonio on Jan. 26 and will pass through Dallas the afternoon of that date. Most of the dealers in San Antonio and a number from adjoining counties will make the trip. The first special train of Texas motor car dealers was for the New York show. It was such a great success and the show proved to be such that hereafter it is expected special trains to New York and Chicago will be run each year from Dallas and San Antonio.

On their return from New York, Texas dealers expressed surprise at the greatness of the New York show.





EDITORIAL PERSPECTIVES



Merit Where Merit is Due

TO the accessory maker must go that reward of merit for giving to the motor car the majority of those essentials of comfort and convenience. The accessory field has had its brilliant engineers as well as the complete car field, and while these engineers have not been heralded before 100,000,000 in advertisements as have some of the car designers, yet they have nevertheless accomplished nearly all of those things that go to make running a car more of a pleasure. Of these accessory engineers so far as public recognition is concerned it might be said:

"Full many a gem of purest ray serene
The dark unfathomed caves of ocean bear.
Full many a flower is borne to blush unseen
And wastes its sweetness on a desert air."

OF these engineers it can be said they have done their work. They have done it well but so often their names have never been associated with the good they have accomplished. In a few cases selfish car makers have attempted to take unto their own engineering forces the honor that rightfully belongs to some accessory engineer.

THE accessory industry with its multitudinous ramifications and with its ten thousand varying activities, some great and some small, suggests the old childhood lines:

"Little drops of water, little grains of sand,
Make the mighty ocean and the beauteous land."

IT has truly been the little accessories that have made motoring what it is to-day. What a volume of comfort we daily take out of the windshield, which only a few short years ago was looked upon as local to Chicago by Haughty New Yorkers, but it was only a few years until the Gothamites saw the error of their way and had to acknowledge that the Windy City had stolen a march on them. What pleasures the handy side curtains have added; how could we get along without the clock, the speedometer, or the demountable rim; and who would care to go motoring to-day without our electric lighting and starting systems, all of which are offsprings of the accessory fold? We might add myriad other examples, the one-man top, the anti-glare headlight, the heater, the tilting steering wheel, the heated steering wheel, the anti-skid chain, the windshield cleaner and the host of tire tools and repairs we need.

BUT we have a few suggestions for the accessory engineer and the accessory maker. These are days of women drivers. Friend husband works in the city and lives in the suburb where he is twenty minutes from the railway station. It is up to madam or the children to drive father to the station in the morning or meet him at night. This motor-brought phase of living has made it as essential for the wife to drive the car as the husband or the son. Everything about the car is not just as satisfactory to-day for woman driving as it might be.

FIRST: The present jacks are not up to par. It is still hugely awkward to get the jack under the rear axle to change a tire. Madam generally gets much in the dust and dirt in doing this. We need a better jack, a kind of tele-distance type, one that can be placed under the back axle without getting on your knees on the road and making yourself a fit subject for a bath and your clothing more work for the cleaner. A little more expenditure of accessory engineer's gray matter, and this may be solved.

SECOND: The accessory engineer may be able to perfect some more convenient form of spare tire or wheel carrier, so that it will not be necessary to have to lift the spare rim with tire or the spare wheel nearly 2 ft. off the ground to mount them in place. On a fairly large car the ordinary woman is not muscular enough for this. The tire carrier might be so designed as to be lowered to the ground by a lever or some simple contrivance. This would help immeasurably. We would also add that it is often harder work getting the tire unfastened from the carrier than changing the rim or wheel. Leather straps are good but they have to be pulled so tightly that the average woman cannot buckle or unbuckle them. Give us some presto fastener that will simplify this entire tire-carrying scheme. Give us some presto device specially designed for woman, and then it will be so much easier for mere man. There is yet a lot of hard work connected with changing tires and as that is about the only work you have to do on the road, why should not more gray matter be expended on making the job so easy that you do not get your clothes dirty, your body heated and your temper ruffled. So often you are in a hurry when you have to change tires. You may have been driving too fast. Consider this and come across.

Better Equipment Conveniences

THE motor car manufacturer will generally give what the buyer demands. The old merchandising maxim of keeping on the counter the goods most in demand cannot be overlooked in fitting out motor cars, even in these days of ultra-production. Much has been done in equipping cars with many of the essentials, but much yet remains to be done. It is possible to purchase cars with very satisfactory components such as motor, clutch, gearset, axles, etc., but what is needed most of all to-day is more attention to those comfort features that should go with each car. The man who drives a car deserves more attention

in this regard than he has been receiving in the past. A few examples will suffice to illustrate the point in question:

EXAMPLE one: The matter of carrying anti-skid tire chains has not been given any attention by the majority of makers, even those selling high-priced cars. There should be a separate chain compartment in every car, with nothing in the compartment other than the chains, with the possible exception of a pair of pliers. This compartment might be in one of the running boards. It could be below the surface of the running board

rather than above it. The compartment might be long enough and very shallow so that each chain folded but once would fill the space. There are many reasons for such a compartment: Chains are invariably dirty when taken off and they should not be placed in a compartment with other tools and should not be dropped on the tonneau floor. The separate tool compartment is one solution. There may be many others.

■ ■

EXAMPLE two: All tire tools should be in a separate compartment and in a very convenient one. There are thousands of owner-drivers who never have to stop on the roads for any other troubles than repairing tires. For a time at least it seems we will have the tire problem with us. Granted that this is so then those tools needed on the road for tire changing should be in a separate compartment and in one of the most convenient places imaginable. These tools, jack, wrenches, pliers and other things might be locked in a compartment by the same key that locks the spare tires in place. It is a nuisance to have to carry too many keys, one for the switch, another for the tool box, others for the tires and perhaps another or so for some other compartment. These locks should be standardized so that one key will serve for practically all parts with the possible exception of the ignition and electrical system.

■ ■

EXAMPLE three: Too few of our cars to-day have any adequate provision for handling baggage. In every five-passenger car there should be a compartment back of the front seats for a suitcase. When not used for a suitcase this could be used for spare clothing; perhaps madam will carry an extra

hat for use in town; or you may have several small packages that can be left in the car while you are having lunch, doing some shopping, or making a social call. It is just as essential to have appropriate baggage compartments like this as to have seats. The owner-driver is entitled to really adequate provisions such as mentioned for baggage.

■ ■

EXAMPLE four: There is ample room under the cowl of many cars to fit up a few compartments which will serve for small nicknacks. Guide books and maps are essentials in every-day touring, and it is more or less of a nuisance to have an armful of such to carry into the hotel when only stopping for lunch. A small compartment with lock would answer the purpose. Then madam has extra veils, gloves, perhaps purses, a muffler, powder puff, a few other essentials, often a pair of rubbers. There is no logical reason why the car should not be fitted to take care of them, so that when you leave it at the curb while taking lunch or shopping or even stopping over night in a strange town or city, many of these essentials would be safe in such compartments. There has been opposition to such compartments, due to their becoming noisy. This is not serious. It will not be surprising to find some accessory makers providing stock compartments which may be attached to many cars; but, why should we have to pay for them? It is the duty of the car maker to supply them. No overcoat is complete without pockets, outside pockets, inside pockets and other kinds of pockets. We do not buy a coat without pockets and then go to some tailor and have pockets put in. So with cars let us work for the complete car. It is fairly complete to-day, but not nearly so complete as it should be.

Gas Inferiority Charged

Illinois Motorists Protest Against Excessive Amount of Water in Fuel

Gasoline Lines Freeze Due to Dilution of Liquid

BLOOMINGTON, Ill., Jan. 22—Many complaints are being registered by Illinois car owners regarding trouble with gasoline and oil, while proprietors of garages are profiting by an extraordinarily heavy run of repair work, due to frozen radiators, carbureters, pipe lines, drain wells and, in some cases, stiffened oil in the crankcase. More trouble is caused, however, by pipe line freezing than any other.

This, it is asserted by mechanics in local garages, is due to a poor grade of gasoline which is being supplied during the present season and which carries a large percentage of water. The water settles in bends, elbows and low places in the pipe line. It freezes there, closing the pipe line and shutting off the supply of fuel.

In many cars there are drain wells in the pipe line, chambers in which the water is drained from the gasoline. This well, it is charged, fills with water, is frozen and the water backs up into the pipe line, freezes and shuts off the gasoline, the same as if the throttle had been closed. Similar trouble is said to have been experienced with some carbureters closed from the bot-

tom by ice, which gradually increases in volume.

It is argued that if a low grade of fuel is used and much of the heavier oil is carried through the frozen carbureter, there is added difficulty in starting the car and making it run properly. Not only are car owners reporting an inferior grade of gasoline, but the institutions that clean clothes with the fluid complain that they have been forced to cease using the ordinary grade and substitute that with a higher test. The lower gas carries so much low-grade oil that clothing cleaned with it long retains the odor of oil. In one shop, a bucket which was filled with the gasoline now in general use, after standing for two weeks, showed heavy oil to the depth of a quarter of an inch, the lighter fuel having evaporated completely.

Lubricating Oil Inferior, Too

Motorists are also complaining of trouble with lubricating oil. Many of the oils in use have not been cold tested, or thinned for winter use. After a car has stood for some time, that oil becomes thoroughly chilled and is almost like tallow. It is almost impossible to start a car, even with the self-starter and many self-starters have been strained so that they are all but ruined by this trouble. Where this condition exists, it is frequently necessary to place the car in gear and haul it a block or two before it loosens up sufficiently to fire satisfactorily. The unusually heavy demand for gasoline and oil is said to be one reason for the trouble, old processes of refining being displaced by modern, which are quicker but not so satisfactory to the consumer.

Makes Use of Rope Tires

Australian Bush Puts Heavy Strain on Rubber Casings; Fiber Is Substituted

At 16 M. P. H. They Ride as Easy as Pneumatics

THE advent of the motor car into Australia to a very great extent has solved the difficulties of transportation usually found in countries of vast distances and comparatively few traveling facilities.

The rough nature of the country over which the cars travel and the excessive heat often experienced have made the cost of rubber tires a serious item in maintenance and in consequence many experiments have been made to obtain a substitute for rubber at a moderate cost. One of the latest inventions which is claimed to have solved the problem of producing an emergency tire at a comparatively low cost is that of the "homing" tire.

When first marketed the "homing" tire was designed for emergency use only in case of a puncture or blowout, but it proved so satisfactory that in the country districts these rope tires are frequently used on all wheels of the car, particularly in rough or stony country. The tires are bullet, nail and glass proof and if the speed of 16 miles an hour is not exceeded, it is claimed that they are almost as easy riding as pneumatic tires. They take the place of both inner tube and casing.

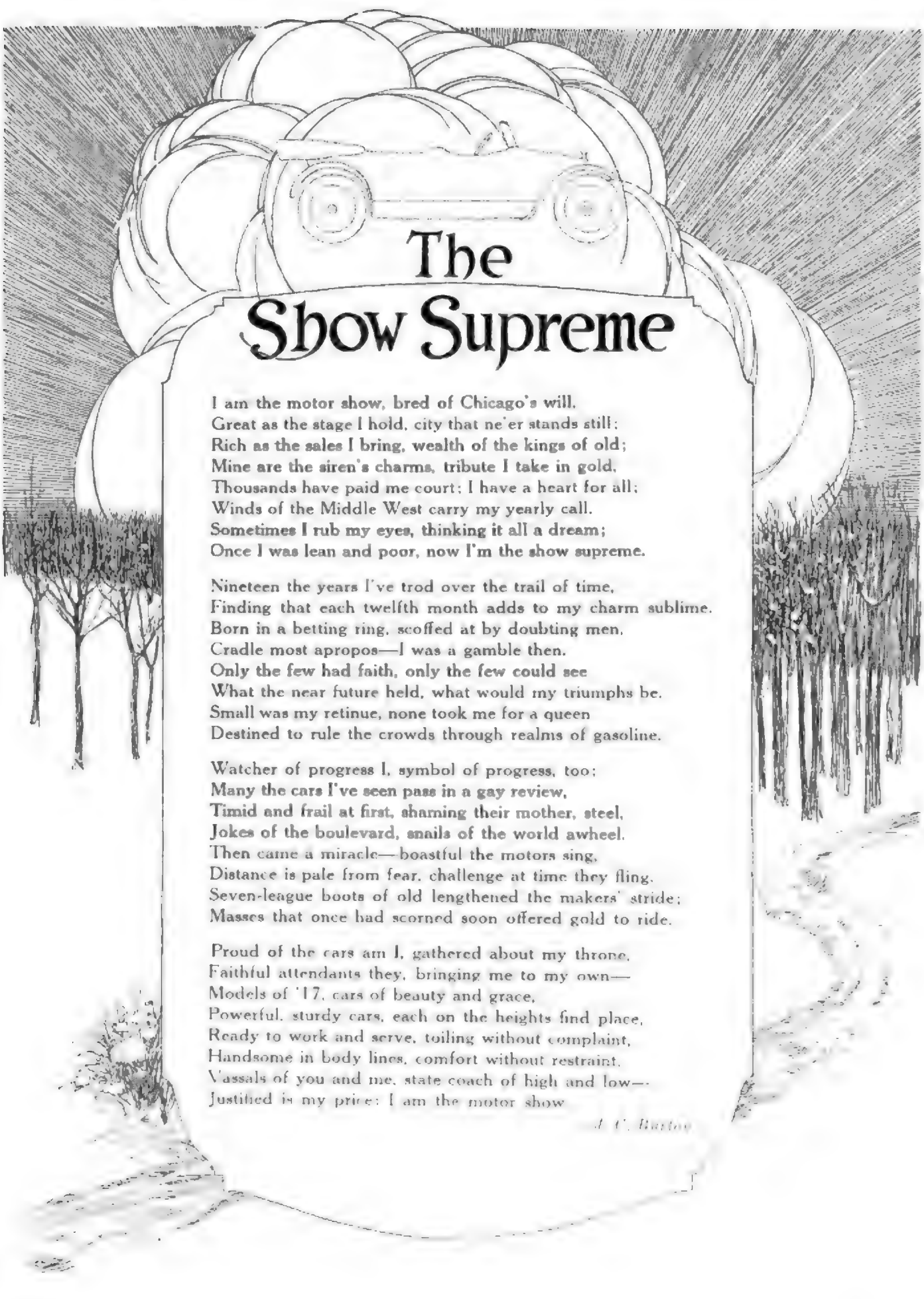












The Show Supreme

I am the motor show, bred of Chicago's will,
Great as the stage I hold, city that ne'er stands still;
Rich as the sales I bring, wealth of the kings of old;
Mine are the siren's charms, tribute I take in gold,
Thousands have paid me court; I have a heart for all;
Winds of the Middle West carry my yearly call.
Sometimes I rub my eyes, thinking it all a dream;
Once I was lean and poor, now I'm the show supreme.

Nineteen the years I've trod over the trail of time,
Finding that each twelfth month adds to my charm sublime.
Born in a betting ring, scoffed at by doubting men,
Cradle most apropos—I was a gamble then.
Only the few had faith, only the few could see
What the near future held, what would my triumphs be.
Small was my retinue, none took me for a queen
Destined to rule the crowds through realms of gasoline.

Watcher of progress I, symbol of progress, too;
Many the cars I've seen pass in a gay review,
Timid and frail at first, shaming their mother, steel,
Jokes of the boulevard, snails of the world awheel.
Then came a miracle—boastful the motors sing,
Distance is pale from fear, challenge at time they fling.
Seven-league boots of old lengthened the makers' stride;
Masses that once had scorned soon offered gold to ride.

Proud of the cars am I, gathered about my throne,
Faithful attendants they, bringing me to my own—
Models of '17, cars of beauty and grace,
Powerful, sturdy cars, each on the heights find place,
Ready to work and serve, toiling without complaint,
Handsome in body lines, comfort without restraint,
Vassals of you and me, state coach of high and low—
Justified is my price: I am the motor show

J. C. Bartoe



















CHICAGO - World Leader in Car and Accessory Distribution

By William K. Gibbs

CHICAGO leads the world as a distribution point for motor cars and accessories. One close in touch with the motor car industry hears millions so much—millions of cars, millions invested, millions earned, etc.—that even a newspaper man, who never had a million and never expects to, gets to speak with as much blase of this often-imagined-but-seldom-realized term as the man who works hard all day, year in and year out, clipping coupons from bonds. If you go down motor row in Chicago to gather figures with the idea that a million dollars is much money you will be disillusioned before you have gone very far. To distributors, this sum seems a mere begatelle.

Scope of Territory

The scope of territory that gets its motor cars from Chicago distributors includes Illinois, Wisconsin, Michigan, Indiana, Ohio, Iowa and Missouri. Of course every distributor does not control this territory in general. Some have very limited territory—four or five counties contiguous to Chicago—while others have all or parts of several states. Accessory distributors have a much wider scope of territory in some instances.

After a canvass of the leading distributors to get figures on the volume of business for 1916, it appears to the writer that a conservative estimate of the business done from Chicago last year, in round numbers, is very close to \$100,000,000 in cars alone. Tires and other accessories, conservatively estimated from figures gained from the leaders in this business, totaled between \$30,000,000 and \$40,000,000 more. Of between twenty and thirty leaders in the sale of cars, and by that is meant the leading makes of cars, only two were found whose total volume of sales for last year were less than \$1,000,000, while the others ran from \$1,500,000 to \$3,500,000 and one around the \$5,000,000 mark. From this it will be seen that the estimated figure of \$100,000,000 in sales of cars alone is conservative when the large number of distributors of cars is considered, for practically every American make of car is represented on or in the vicinity of Michigan avenue, Chicago. One tire concern sold \$8,000,000 worth of tires last year, while others showed total sales of from \$2,000,000 to \$3,000,000.

National Automobile Chamber of Commerce statistics show that the total value of motor cars produced last year was a

little over \$1,000,000. Thus, it will be seen that Chicago distributed 10 per cent of the total volume of cars manufactured in this country last year. With figures to show the volume of motor car business handled in Chicago last year thus substantiated, the statement made in the opening sentence of this article may be made without fear of contradiction. One of the largest Chicago dealers makes the statement that Chicago is first in distribution, Kansas City second, and New York, third.

The James Levy Motor Co., which handles the Chalmers, Premier and Saxon in northern Illinois and Indiana, did a total volume of business of approximately \$2,000,000 in 1916. As an interesting sidelight on the life of James Levy, who heads this company, it can be said that he was born at Michigan avenue and Twenty-fifth street, got his education at Michigan avenue and Twenty-fourth street and has been in business for the last 10 years selling cars at Michigan avenue and Twenty-third street.

The volume of business done by C. H.

Chicago pays more than 40 per cent of the motor vehicle license fees collected in Illinois, and Illinois ranks second in number of cars.

The number of passenger cars licensed in Chicago from May 1, 1916, to Dec. 8, 1916, was 46,082, which exceeded the entire number of cars licensed during the previous twelve months by 10,861 cars.

During the seven months ended Dec. 8, 1916, 10,237 commercial trucks were licensed in Chicago, 2853 more than were licensed in the whole year preceding.

Money paid into the Chicago treasury for vehicle licenses of all kinds during the seven and one-half months ended Dec. 8, 1916, amounted to \$971,401.32, of which nearly 632,000 was for motor cars. In the year preceding this period collections for vehicle licenses were \$768,249.88, nearly \$500,000 of which was for motor cars.

Foster, who sells the Cadillac in the northern half of Illinois and northwestern Indiana through the Chicago branch and twenty-five sub-dealers, was \$2,500,000. This represents 850 cars sold. Since the beginning of the new fiscal year, July 1, and up to Jan. 1, 1917, sales are 350 cars ahead of the same period in the previous fiscal year.

Frank H. Sanders sold approximately 350 Franklins in 1915, the total volume of business being \$750,000. Present indications point to doubling this figure in 1917, and last year's figures were a material increase over 1915.

5000 Overlands Sold Last Year

C. W. Price, Overland distributor, in twelve counties in northern Illinois, through the Chicago office and a number of sub-dealers, disposed of 5,000 Overlands last year, 3,000 of these being retail and 2,000 wholesale. The total amount of business amounted to \$3,500,000, and represents a 100 per cent increase over the previous year. Mr. Price has attempted to analyze 1917 and he says from reports made, the question more likely to confront him is, can enough cars be obtained rather than enough orders be written.

No figures are obtainable on the volume of business done by the Packard branch in Chicago and the distributors which it controls in Chicago, Peoria, Rockford, Milwaukee, Dubuque, Grand Rapids, South Bend, Danville, Ill., and dealers in a number of Illinois cities. The Packard branch in Chicago has charge of the distribution of Packards in parts of Illinois, Iowa, Wisconsin, Indiana and Michigan.

Thomas J. Hay, distributes the Chandler in the northern half of Illinois and river towns of Iowa and northwestern Indiana and southwestern Michigan. The sales last year were approximately \$1,500,000. The White Co. branch covers the territory embraced in the northern half of Illinois and the lake towns of Michigan and Indiana. The Winton Co., which operates in Chicago at a factory branch, has the distribution of Wintons through sub-dealers in Wisconsin, Illinois, and parts of Missouri and Iowa.

The Louis Geyler Co., with the assistance of some eighty or 100 dealers, distributes Hudsons in the northern half of Illinois, the river towns of Iowa and two counties in Indiana.

Distribution of the Maxwells by the factory branch in Chicago is confined practically to Cook county. The Maxwell company began operating as a factory branch

last July and the quarters then occupied were found adequate, but recently more space was needed and it has moved to Michigan avenue and Twenty-sixth street. Retail sales last year in Chicago were 1,200 cars, which represented a 300 per cent increase over the previous year and the business since July 1, shows a 200 per cent increase over the same period in 1915.

The Tennant-Oakland Co. sold 1,100 Oaklands in Chicago and four adjoining counties last year, the total sales being approximately \$1,000,000, while the sales of the Oakland Motor Car Co., a factory branch, controlling northern Illinois and eastern Iowa sold \$2,000,000 worth of cars.

Distribution of Locomobiles made by the factory branch of Chicago covers the territory embraced between Denver and the eastern boundary of Ohio and between Canada and New Orleans. Two branches under the control of the Chicago branch are located at St. Louis and Kansas City. Sales for the Chicago branch were between \$1,500,000 and \$2,000,000 in 1916, this representing actual sales of between 200 and 250 cars, a material increase over 1915 sales. At present the Chicago branch is taking orders on a 2 week's basis of delivery. While the company makes no custom bodies itself, it does a business with custom body makers that averages \$50,000 a year.

Four counties in Illinois, one in Wisconsin and one in Indiana, are embraced in the territory of L. Markle & Co., Studebaker distributor. Sales last year amounted to approximately \$2,000,000, the total number of cars sold being 1,800. This represents an increase of 40 per cent over 1915.

Sales to the amount of \$2,600,000 were made by the Oldsmobile company's Chicago branch, the number of cars sold being approximately 300. The territory controlled by this branch represents about two-thirds of Illinois, half of Iowa, northwestern Indiana, and north to the Wisconsin Illinois state line.

A Large Territory

The Bird-Sykes Co., which handles the Paige in eight of the northern counties of Indiana, in Illinois from Springfield north to the state line, and the eastern half of Iowa, sold 1,500 Paige cars in 1916, the aggregate sales totaling approximately \$2,000,000, which represents a 25 per cent increase over the previous year.

The Centaur Motor Co. distributes the Jeffery in northern Indiana and Illinois, and sales last year were approximately \$1,500,000. Eight hundred cars and 100 trucks were sold by this company in 1916, which represents about three times as much sales volume as in 1915. This company took over the Jeffery distribution in this territory 3 years ago. Based on sales since the beginning on this company's fiscal year in August, it expects to sell from 1,200 to 1,500 cars and from 150 to 200 trucks in 1917. The increase in sales for the first 5 months of the fiscal year over the preceding period is 65 per cent.

Distribution of Dodge cars to the extent of \$1,500,000 in Chicago and six counties

adjoining was made by the Dashiell Motor Co. last year. This is a material increase over the preceding year, when the Dodge was practically a new car on the market. Prospects for the future are very bright and it appears that sales will be limited only to the number of cars that can be obtained. At present there are 2,500 Dodge cars operating in Chicago alone.

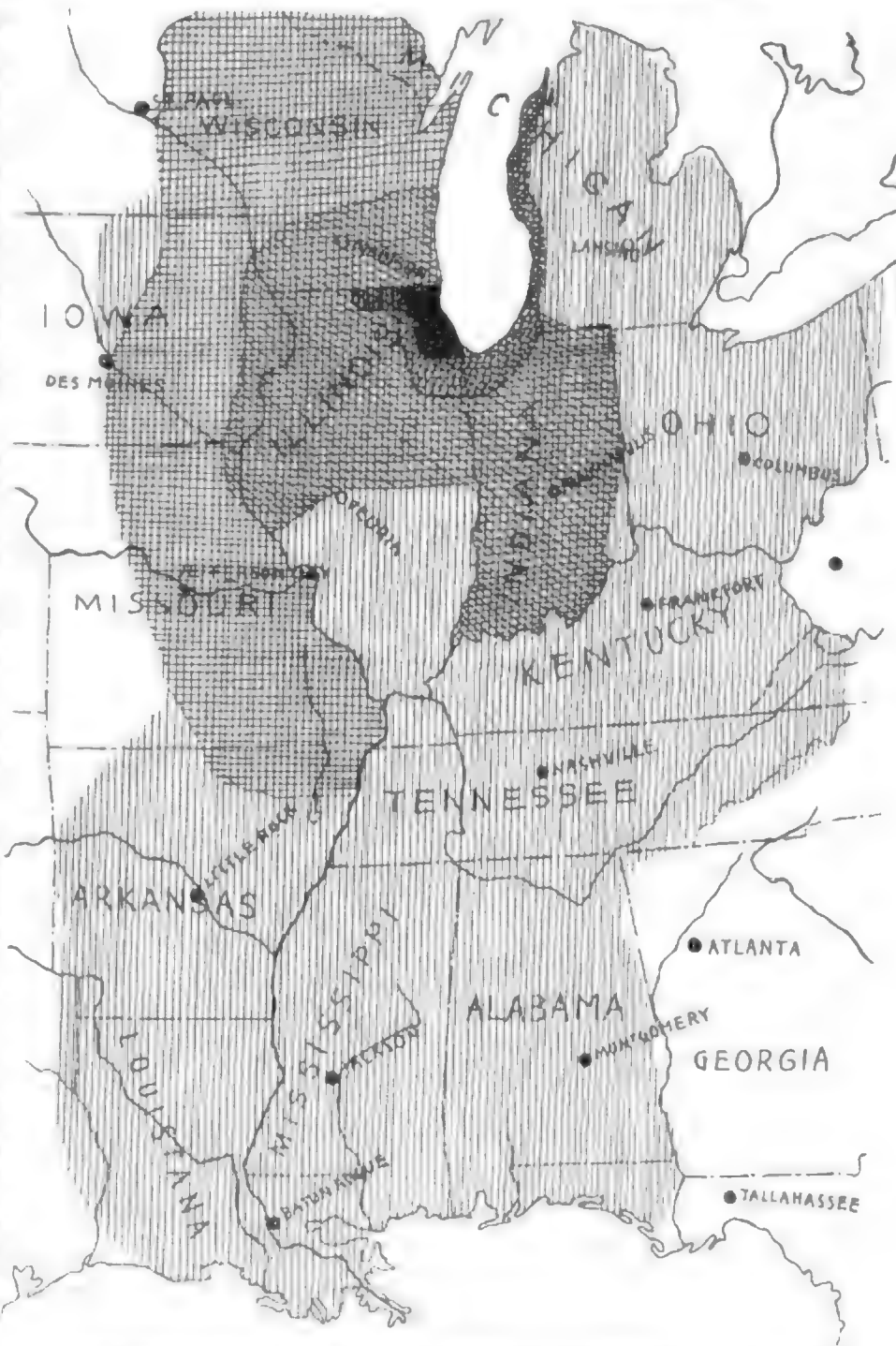
The Henry Paulman Co., Pierce-Arrow distributor, has a territory that embraces northern Illinois and parts of Indiana and Michigan. No definite figures on the amount of business transacted last year are obtainable.

Sales made by the Ralph Temple Automobile Co., Jackson Empire and Monroe distributor in Illinois, southern Wisconsin, eastern Iowa and northwestern Indiana, totaled approximately \$1,000,000 last year.

The Marmon Chicago Co., which distributes the Marmon in northern Illinois, northern Indiana, Wisconsin and the river towns of Iowa, sold 400 cars last year and has been allotted 750 by the factory for the coming year.

J. V. Lawrence, who distributes the Velie in parts of Wisconsin, Michigan, Indiana and Illinois, sold 700 cars last year.

(Concluded on page 45)



This map shows the sphere of influence of Chicago as a distributing point for cars and accessories. The darkest part shows where various territories begin and overlap is shown by the various grades of shading. The largest territory, that indicated by the vertical lines, is that of a tire company.















not come to the station and have to wait for his car. Every job is thoroughly tested before it leaves the shop and all work checked by a man who has no other duties but this.

Another feature of the Packard service is the renting of parts so that it is unnecessary to lay up the car while repair work is being done. For example, if the car owner has a collision in which his radiator is damaged and perhaps a wheel broken, he would find it necessary to lay his car up perhaps ten days while the wheel is being repaired and repainted and the radiator put back in shape. Naturally he does not wish to give up the use of his car and he is given the privilege of renting a radiator at 50 cents a day and a wheel at 25 cents a day while his own parts are being repaired. This renting privilege applies to magnetos and other electrical equipment as well as numerous smaller parts of the car. This service is extended to truck owners as well as car owners. To give some idea of the large volume of parts that must be carried in order to accommodate all models of Packards, it might be said that in radiators alone, twenty-eight different styles are carried. One hundred and forty men are kept busy at the Packard service station and from forty to seventy cars a day are given attention.

Packards carry a ninety-day guarantee, but if any part is shown defective even though the defect does not show until after the guarantee has expired it is replaced gratis.

Boys Work on Roller Skates

In the Overland service station each class of repairs has its special department there being one for motors, one for radiators and fenders, one for rear axles and transmissions, one for battery and electrical work and a special department for Knight motors. Perhaps one of the most novel features of the Overland service station is the fact that the boys who get repair parts and take them to the particular car being worked upon travel on roller skates. C. W. Price, who handles the Overland in Chicago, believes that this method saves much time that would otherwise be charged up to the owner. The service station houses repair, machine, paint, trim and body-making departments as well as the general offices and accessory departments. Delivery of all cars is made in this building and all cars, even though new, are given careful inspection before delivery. The character of service rendered Overland owners includes everything that is believed to be morally right, and the station is equipped to handle and has handled as high as 350 cars in a day. There is a large yard in the back of the plant. It is used in summer for cars coming in for service and there is a runway from this yard leading to the second floor on which cars can be run up to the second floor on their own power. Six competent service men are

constantly on the road in the territory controlled by the Overland Motor Co., to assist sub-dealers in handling service to owners.

The White Co. offers an inspection service to White owners and all repair work is inspected before the car is turned over to the owner. Ninety days service is given at the service station and there are a number of traveling service men who travel about the territory embraced in northern Illinois, and the coast cities of Michigan and Indiana rendering service to owners. The average number of cars handled in the White service station each day runs from twelve to fifteen.

Thomas J. Hay, Chandler distributor, offers a coupon book which gives service on Chandler cars for six months. In addition there is the regular free inspection which consists largely of oiling and greasing and making minor adjustments. The present service quarters have been found inadequate and a lot has been purchased directly back of the present salesroom at 2519 Michigan avenue, and plans are now being prepared for the three-story service building which probably will be ready for occupancy some time in the spring.

All free service is being discontinued by

the Winton Co., at the factory branch in Chicago. This company furnishes a service at \$7.50 a month and Winton owners who care to avail themselves of this service sign a contract to that effect and are urged to bring the cars in at least once a month for such repairs as may be necessary. This class of service is extended to Winton cars dating back five years. Practically everything is included in this special service which might result even when ordinary care is used in driving and the Winton company finds that all of the different repairs embraced in the contract can be performed at this price although if it was found necessary to perform all of the service to which the contract entitled the owner once a month it could hardly be done at a profit. It has operated free monthly inspection, oiling and greasing, but this plan is to be superseded by the one just mentioned.

The territory in which the local service branch of the Winton Co. operates is confined to Chicago and nearby towns, although the territory controlled by this factory branch includes Wisconsin, Illinois, most of Indiana and two-thirds of Missouri and Iowa.

Provisions of the Chicago Automobile Trade Association Service Warranty

First: For a period of one month after delivery of all passenger and commercial cars purchased from us we will make all necessary adjustments without charge, provided the car is delivered at our Service Department, has not been injured through accident or neglect, and has had no adjustments except those made by ourselves. After that time all work done and materials furnished will be charged for at our regular rate.

Second: All parts upon which credit is given, either by the factory or ourselves, under the Manufacturer's Warranty, will be installed without charge, for a period of thirty days after delivery. Thereafter, all such labor must be paid for at regular prices, and the customer must pay for parts as well as the labor for their installation, pending the factory's decision as to credit claims. If the factory allows credit a refund will be made for all parts paid for.

Third: Whenever it becomes necessary and unavoidable to do gratis work away from our regular service station, a charge will be made covering the expenses of the workman's time going to and from the point where work is done, plus any charges for board, lodging, transportation, freight or express, or for other incidental expenses which would not be normally incurred where work is done at our shop.

Fourth: Whenever overtime work is necessary or required a charge will be made for double our customary rate.

Fifth: If, at the time gratis work is being done, it becomes necessary to do other repair work, not under the Service Warranty, the labor and material required therefor will be charged for at our regular price.

Sixth: We make no warranty or representations in regard to service or replacements of electric starters, batteries, generators, lamps, carbureters, tires, rims or other trade accessories, but will upon request assist in presenting claims regarding service or adjustments on any of these articles.

Seventh: It is expressly understood that the failure of the dealer at any time strictly to enforce any or all of the provisions of this Warranty shall not be regarded as a waiver of these provisions, but the dealers may at any time in future enforce any or all of the provisions herein set forth.

Plan 1000-Car Dixie Dedication

If Completed This Year Big Motorcade Will Be Arranged—Few Parts Now Impossible

LOUISVILLE, Ky., Jan. 20—If the Dixie highway is completed by fall a dedication trip of approximately 1000 cars will be arranged. Completion of the Dixie highway for a stream of motor car traffic awaiting the word from the North is held back only by two broken lines—in the mountains of eastern Kentucky and in Tennessee, between Nashville and Chattanooga—according to a delegation of twenty-five men from Cincinnati, Lexington, Richmond, Berea, Mount Vernon, London, Barbourville, Middlesboro and Knoxville, who called on Governor Stanley and Commissioner of Roads Rodman Wiley in the executive offices recently.

Their mission was to ask for the application of federal and state aid money this year to construction and bridging, particularly in Rockcastle and Laurel counties, both of which have issued bonds and about gone the limit of their resources in road construction.

Rockcastle has built to Livingston and Laurel county to the mouth of Parker's creek, 6 miles away. Wildcat mountain must be negotiated and Rockcastle river bridged. Neither county is willing or able unaided to build the link between Livingston and Parker's Creek.

The statement was made that from Cincinnati to Berea the road is good. Bell and Knox are constructing good roads, and S. F. Sanford of Knoxville, a director of the Dixie highway, said Tennessee is completing a macadam roadway that is finished from Chattanooga to within a few miles of Cumberland Gap. The Boone Trail, running from Roanoke and the East, joining the eastern branch of the Dixie highway at the Gap, is completed southward to Mount Vernon.

ALLEY TO RACE CHICAGO SIX

Chicago, Jan. 20—Tom Alley will be seen at the wheel of a Chicago six during the 1917 racing season and will make his first appearance with the new mount at the Memorial day race, Indianapolis. Alley is now building the car for the Pan-American Motors Co., and is fitting one of Harry Miller's new aluminum engines, similar to the one which Barney Oldfield will campaign his Delage with. This engine has aluminum cylinder jackets and is so arranged that by slipping sleeves of different size inside the jackets the cylinder bore can be altered to conform with the piston displacement limit of different races throughout the season. The change from a 450-inch engine to 300-inch engine can be made in about 2 hours. The engine also has a feature that all water

and oil leads are within the cylinder casting.

Miller is building six of these engines, one or two of which Oldfield will have, and one goes to Alley. Miller also is building a twelve-cylinder aviation engine along the same lines which Oldfield may use in exhibition and time record work.

BRITISH DETAIN RICKENBACHER

Chicago, Jan. 20—Predictions that E. V. Rickenbacher's surname would get him into trouble with the allies on his trip to Europe in his search for a racing mount for Indianapolis interests are proving true. In a letter just received by H. G. Bradfield, advertising manager of the King Motor Car Co., Rickenbacher writes he was detained several days at Liverpool by the authorities, who thought he might be a German spy. However, he was released after a few days and has gone on to Paris. Rickenbacher says that there are practically no cars being manufactured in England except for war purposes.

GURNEY SUCCEEDS TREGO

Springfield, Mass., Jan. 20—Frank H. Trego, who has been chief engineer of the Knox Motors Co., has been succeeded by E. R. Gurney, formerly of the engineering department of the General Electric Co., and who has co-operated with Mr. Trego in the production of Knox 300 h.p. aeroplane engine.

CHANGE IN SELDEN PRICES

Rochester, N. Y., Jan. 20—The Selden Motor Vehicle Co., has changed the prices on its models, effective Jan. 15, as follows: Light delivery worm drive, $\frac{3}{4}$ -ton, \$985; 1-ton worm drive, \$1,850; 1-ton internal gear drive, \$1,385; 2-ton worm drive, \$2,350; 2-ton internal gear drive, \$2,150; $3\frac{1}{2}$ -ton worm drive, \$3,150. This company will announce a 5 ton model shortly.

HAMILTON MOTORS TO ORGANIZE

Detroit, Jan. 20—Following closely on the appointment of the receiver for the Alter Motor Car Co., comes the announcement that the Hamilton Motors Co. will be organized at Grand Haven with a capital of \$500,000. Originally, the Alter company planned to erect a large plant at Grand Haven and many Grand Haven and Muskegon citizens subscribed for Alter stock. People, interested in the deal at Grand Haven, repudiated it, according to H. W. Voorheis, receiver for the Alter company, and the new Hamilton company is the result.

Guy Hamilton, who is organizing the new

concern, has planned to ask holders of Alter stock in western Michigan to exchange it for the stock of the Hamilton company, on an equal exchange basis. The new concern will manufacture cars slightly larger than those made by the Alter company, the Hamilton four having a wheelbase of 110 in., and the Hamilton six having a 115-in. wheelbase. There also will be a slight advance in price. Two models have been built and production is planned to begin Feb. 1. Application has been made to the Michigan securities commission for the sale of treasury stock.

COLLINS WITH RACINE RUBBER

Chicago, Jan. 20—C. R. Collins, advertising manager of the Stromberg Motor Devices Co., has resigned to become advertising manager of the Racine Rubber Co., Racine, Wis., commencing Jan. 22. Collins successor has not been named.

N. A. A. J. ANNUAL AT CHICAGO

Chicago, Jan. 22—The second annual meeting of the National Association of Automobile Accessory Jobbers opens today at the Congress hotel, although the sessions today and tomorrow are committee meetings and the regular meeting begins Wednesday morning at 10:30 a. m. The meeting will continue until Friday when one session is to be held.

MURRAY HEADS NATIONAL RUBBER

New York, Jan. 22—Special telegram—James A. Murray, vice-president and general manager of the Seamless Rubber Co., New Haven, Conn., is to become president and general manager of the National Rubber Co., Pottstown, Pa., March 1. Murray is one of the most widely known men in the rubber industry, having been with the Seamless Rubber Co. 22 years. Jacob G. Feist, who retires as president of the National Rubber, becomes commercial and sales manager.

RE-ELECT OFFICIALS 21ST TIME

Cleveland, O., Jan. 20—The Winton Co. has re-elected Alexander Winton, president; Thomas Henderson, vice-president, and George H. Brown, secretary and treasurer, which marks the twenty-first annual election of these three men to these respective offices. This record is probably without precedent in the motor car industry and may be without equal in the entire business world. Incidentally these are the only officers the Winton company has ever had, their terms of office beginning at the inception of the corporation and continuing without break to the present time.

Ralph Temple, W. M. Woodside, Senator Morgan and Harry Higham were the professionals. Dan Canary was one of the trick bicycle riders in those days. The old Exposition building has long since been torn down, but the memory of those wonderful bicycle days still lingers.

The first show made such a stir and created so much attention that it was repeated in 1889 and in the five or six years that followed. It was not long until the number of exhibits had outgrown the old Exposition building, and Miles rented the Second Regiment and Battery D armories in which to stage his show. Associated with him about this time were N. H. Van Sicklen of the Van Sicklen Co., maker of speedmeters, and Walter Wardrop, publisher of the Power Wagon.

Was to Use Old Coliseum

The old Coliseum out on Sixty-third street was being erected in 1896 when Miles was preparing to hold his annual bicycle show and race meet, and Miles made a contract to run bicycle shows of all descriptions in it for five years. Just about two weeks before the date of the show that year the building fell down, and Miles never had to undertake the contract, which probably was just as well as Miles went back to England temporarily the next year and the decline of the bicycling craze began.

But when the building suddenly collapsed Miles found himself a showman without a home. Each year he had found it hard enough to make room for exhibits and a track and still leave room for spectators. This capped it all. The only available building that would answer the purpose at all was Tattersall at Twelfth and Armour. A skating rink occupied the building under normal circumstances, and ice was not very propitious for racing. But the show had to be held, and held it was. The powers that were of Tattersall wouldn't let Miles take the ice out, so he showed on top of the ice. This meant the building of a platform over the ice.

Published Referee in London

The next year Miles took his Referee to England. He published it from London in three different languages, English, French and German. He stayed away only a year, however, and on his return the Referee and N. H. Van Sicklen's Bearings and Cycling Life, which was owned by Walter Wardrop, were combined. These publications were united under the name of Cycle Age and were published with this title for two years, at the end of which time the name was changed to MOTOR AGE. Miles was editor.

The bicycling craze was now practically a thing of the past. But Miles was not long without a show to promote. The odd self-propelled vehicles already evolved attracted his attention long before they were thought to be the vehicles of the future. When Charles Duryea was experimenting with one at Asbury Park, Miles had John

Witmore write a one-page description of it for Cycle Age. The Cycle Age was printing about three or four pages of motor news, and the rest was speculation mostly as to what the new era of motors would bring, together with any available descriptions of experiments along the lines of Duryea's.

1901 Started Motor Shows

Miles thought 1901 ripe for starting the new vehicle on its way with a send-off of the publicity of bicycle days. He rented the biggest building he could find for the send-off, the Coliseum. He really intended to have the show the year before when New York had its first one in November, but the roof of the Coliseum fell in and the show had to be postponed.

Financing the show was not the real problem of that first exhibition at all, even if it was an uncertain undertaking both from a business and a pleasure standpoint. The real problem was to get enough vehicles to show. Finally, however, by dint of much persuasion and what force could be brought to bear without overstepping the bounds of reason eighteen motor vehicles were scraped together. A track 20 ft. wide and ten laps to the mile was constructed, partly to fill space and partly because the flavor of the old bicycle exhibition and race meet was still the criterion of popular demand. The show was held March 23-30 with these eighteen vehicles and about twenty-four accessories.

His Mishaps Furnished Amusement

A man named Holson furnished most of the amusement. He had a two-wheeled electric vehicle, which had a heavy battery swung on the axle to balance the weight of the driver. The vehicle was steered by stopping one wheel and turning the other in the direction in which the driver wished to go. If Holson made the slightest mistake he went through the fence of the track. And he went through often.

The week's receipts for the first show were \$3,200. Passes were issued liberally, and the daily attendance was counted in hundreds. But the future of the show could be foretold and was by Senator Morgan as he looked down from the balcony and said to Miles:

"The day is coming when this building will be filled with cars."

The cars may not have filled the building the next year, but the increase in their number made it necessary to leave out the track. Because Miles thought the public should have something to take the place of the track, the racing machine was devised to act as substitute. This consisted of rollers with a dial so attached that the speed of the car on the roller was registered thereon. There were two of these machines, and they were kept busy. A car would register as much as 2 miles in about 45 seconds, and everybody thought it a wonderful record. The steamer was the most remarkable in these performances. It was the car. Each car was lashed on the

rollers with a chain to guard against any danger to the crowd. Nothing ever happened, however, and it is doubtful which drew the most attention, the racing machine or the exhibit proper. The day of the racing machine was not long, however. The public soon outgrew it, as did the exhibitions. The car family adequately filled all needs.

The Chicago Automobile Club was interested with Miles in the success of the second show, and the third year the National Association of American Manufacturers took charge and made Miles general manager of its organization. The balcony of the Coliseum was used for exhibits the first time during the third show in spite of the fact that the Coliseum Annex had been added in 1902. After that first year the success of the shows was never doubted by the public. They paid \$8,930 to get in in 1902 whereas they had come only grudgingly when given passes, many of them, the year before. And each year they have paid more and more to get in as the increase in attendance has brought the total receipts higher.

Millions Have Come to Shows

The crowds that do and have attended the showman's shows give an appalling figure. Miles has had charge of approximately 10,000,000 persons during the course of his life as show manager. In all this time not one has been injured. Miles himself gives the city credit for this, citing the very particular inspection that is required. But the show manager himself knows that nothing that is not fireproof goes into the building. The Coliseum has fourteen doors, and every door is open every minute during the time spectators are at the shows. Miles doubts if any building in the world can be emptied as quickly.

Everything this showman uses in his Chicago shows is made in the city. This year approximately \$75,000 will be spent during the course of the show by the management alone. The amount that will be spent by those who come to the city to attend the show cannot be estimated. That so many do come, however, is another witness to the success of the showmanship expended in making Chicago's motor shows what they are and have been every year since their inception, with the exception of the one year, 1907, which was a panic year and which cut the attendance 10 per cent.

Manager of Every Chicago Motor Show

While Chicago cannot and does not attempt to claim Miles as its exclusive show manager, the record of every motor show with Miles as manager is one that cannot be bettered elsewhere. And when the seventeenth Chicago national motor show opens Saturday afternoon it will be the seventeenth Chicago national motor show of which Miles has been the manager—and the successful manager.

Row Retrospect

Comparatively Few Dealers Leave Chicago's Motor Home but the Factory Gets Them and Among Those Are the Men Mentioned Here

IT IS not the purpose herein to trace the chronology of Chicago's row or the dealers who make that row. Sufficient is it to say that the chronology would be that of a constant growth, a growth such as that which in 1905 gave to Chicago the championship belt in rows over the Avenue de la Grand Armee of Paris, which until that time had boasted that it was it when the display of motor cars and accessories was the question for decision.

Comparatively few dealers have left the row. Fewer have left the row for other occupations. We hear the same names in connection with the Chicago agencies that we heard when the motor show was young and untried and when the row was almost as young. That the row trained those who left to take and hold their places in the motor industry in higher positions is evident in the names of those who since leaving the row have joined the forces of the manufacturers.

Friend and Tilt Head Plants

Take Otis Friend and C. A. Tilt. They are now presidents of the Mitchell Motors Co., Racine, Wis., and the Diamond T Motor Car Co., Chicago, respectively. Take Fred W. Warner, W. E. Stalnaker, A. J. Banta, Charles S. Jameson, E. W. McGookin, Orlando Weber, Frank H. Trego and L. J. Ollier. Warner is now vice president of the Oakland Motor Car Co. of Michigan, Pontiac, Mich. Stalnaker is vice-president of the Pathfinder Motor Car Co., Indianapolis, now a part of the Federated Motors Co. Banta is vice-president of the Premier Motor Corp., Indianapolis. Jameson was second vice-president of the Willys-Overland Co., Toledo, until his death. McGookin is vice president of the Springfield Body Co., Springfield, Mass. Weber was vice-president of the Maxwell Motor Co., Detroit, until his resignation last month. Trego is vice-president of the Springfield Motors Co., Springfield, Mass. Ollier is vice-president of the Studebaker Corp. of America, Detroit.

Sales Departments Take Some

Other dealers went into the sales department of one or other of the factories, for the row has no equal perhaps, and certainly no superior, in training salesmen. The row could use all its trained salesmen, but as long as the motor industry continues to grow as rapidly as it has in the past, the row probably will continue to lose some of its best salesmen to the factories. Among those who now are connected with the sales department of some factory are: L. E.

Willson, who is sales manager of the Briscoe Motor Corp., Jackson, Mich., and who also is president of the Motor Car Sales Co. on the row; C. F. Stewart, sales manager and advertising manager of the Bour-Davis Motor Car Co., Detroit; E. G. Kilborn, general sales manager of the Liberty Motor Car Co., Detroit; and J. A. Bell, who is in the territorial sales department of the White Co., Cleveland, Ohio.

M. D. MacNab is now general sales manager in charge of all branches of the Smith Motor Truck Corp., formerly the Smith Form-A-Truck Co., Chicago. Webb Jay, who first sold the White car and then the Jeffery on the row, is now supervisor of the Stewart-Warner Speedometer Co. department that makes the vacuum tank he invented. He also is connected with another Chicago company, the Webb Jay Corp., which makes the gage used with the said vacuum tank. J. H. McDuffee, agent for the Stoddard at one time, is assistant sales manager of the Willys-Overland Co. W. J. Zucker, who at one time represented the Stewart-Warner company on the row, is now sales manager at the Stewart-Warner factory.

Emanuel Lascaris of Chicago De Dion fame now heads the Automobile Importers Alliance, Inc., New York. He is a Frenchman and though he is not known to have ever claimed the descent for himself, public favor has it that he is descended from the kings of Sardinia and that his real aim in life was, and may be yet, to rob New York traffic of its horrors by putting De Dion buses on on every street and avenue. Be that as it may, Chicago knows that he was one of the strugglers in the old Paris-to-New York race in early row days, when he took the place of one of the other De Dion men. He is one of the reasons for the salon held in the ballroom of the Hotel Astor each year.

With the exception of Lascaris the other men mentioned are now with motor car plants. Some of the men are with those makers whose cars they sold on the row. Willson sells Briscoes on the row by proxy and at the factory in person. Friend sold Mitchells when he was on the row. Bell was at the White agency. Tilt heads the company whose products he once sold on Michigan avenue. Zucker also is with the factory whose products he once huddled on the row, Stewart Warner.

Some of these men from agencies on the row have worked up through the factories to the positions they now hold. Friend was

advertising manager at the Mitchell plant three years ago and has held other positions with the factory. He was on the row with the Mitchell agency ten years ago. Ollier was sales manager of the Studebaker Corp. about the same time Friend was advertising manager of Mitchell.

Some Interesting Stories

The row tells some tall tales on these former men, and the tales are far from uninteresting. If every dealer could be compelled to keep a diary for a short time during his agency the sum total would add a big chapter to row history. For instance, Earle McGookin. McGookin was at one time local manager on Michigan avenue for the Stewart & Clark Mfg. Co., maker of the Stewart speedometer. He went to Detroit as factory sales manager for the Stewart-Warner Speedometer Corp. and is now president of the Springfield Body Co. McGookin, we are told, started his stellar career as a ticket seller in the theatrical business. Whether he hit the sawdust trail where they carpet the ticket wagon with greenbacks or flipped the white and parti-colored slips through the ornate window of a luxurious theater lobby is not the matter for discussion. But judging from later details it must have been the ornate window. When he went into the motor car business he found himself with a seemingly superfluous habit of dressing the part too well, but it was too late to reform. He never lost his propensity for good dressing and to-day is considered by Detroit, the home of the motor industry, as the Beau Brummel of the motor car industry.

A Stotchy Scotchman

M. D. MacNab, than whom there is no Scotchier, also owns a suffix M. D.—M. D. MacNab, M. D. He practiced medicine some several years—let the number be kept dark for the sake of curiosity—and now alternates business and pleasure. For three years he was branch manager of the United Motors on the row and later was vice-president of the Marion Handley Motor Co., Jackson, Mich. Besides being a prize golf player himself, the doctor has a prize collection of dogs, Scotch terriers and Scotch collies to go with his name, which in its full effect is Malcolm Donald MacNab.

Otis Friend was considered the best sailor on the north side while he lived in Chicago. He and Will Tennant owned a one-masted yacht and belonged to the old Evanston Yacht Club, long since a mere memory.

Fred Warner gets a great deal of his reputation through his apparent craving for work. He was manager of the Chicago branch of the Buick formerly and later went to the Oakland Motor Car Co. of Michigan, where he filled the positions of general sales manager, general manager and president in time. He still has the last two titles attached to his name. Warner started in the implement business and "just naturally turned" to the motor industry. Perhaps he got the working habit in the implement days. W. G. Tennant of the present Oakland agency on the row calls Warner one of W. C. Durant's most able men. Many of the row men call him "Old Ironsides" because he works so hard, and the night shift at the factory have told it on him that he comes to work in the summer as early as 4 o'clock in the morning sometimes. Besides being president and general manager of Oakland he is a director of the General Motors Co.

Kilborn Ran a General Store

E. G. Kilborn used to be the Chicago wholesale manager for the Oakland Motor Car Co. of Michigan. Before that he was a representative of the General Motors Truck Co., Pontiac, Mich. He is now the general sales manager of the Liberty Motor Car Co. The story of his rise in the industry involves that of his business life prior to it, for his business ability is traced to that time. He ran a general store at Decatur, Ill., for years and made quite a success of a small beginning through his management.

Charles S. Jameson was a favorite of the row. In 1906 he was vice-president and general sales manager of the McDuffee Automobile Co., then agent for the Stoddard-Dayton. Later he became general sales manager of the Willys-Overland Co. and finally, second vice-president. Chicago's row remembers him especially well as a man of a remarkably sunny disposition. He usually was called "Jamie."

Jack Banta was Chicago manager of the Locomobile Co. of America branch for eight years. The territory included the region west of Chicago to the Pacific, and Banta not only was a successful manager but a prominent man in local affairs. Club runs were a hobby with him, as the Banta trophy may signify. He is now vice-president and general manager of Premier.

Ollier Still Manages Sales

L. J. Ollier is still a sales manager, though he is also vice-president of the Studebaker corporation. Nine years ago he was sales manager for Ralph Temple on the row, and he has been sales manager at the Studebaker factory several years.

W. E. Stalnaker was one of the early comers. He was very keen for organization of the row forces through the trade association and made a reputation for himself as a man always ready to co-operate in any way that would build up the motor industry.

In C. A. Tilt, president of the Diamond T

Motor Car Co., we have another man who has acquired a name for superiority in sports. He is not only fond of fishing and hunting, but he is one of the best followers of Isaak Walton and Diana in Chicago. As for his work, "Tilt is the Diamond T," it is said.

Joseph H. McDuffee was long active on the row, leaving only when the uncertainty of Chicago weather drove him to seek more certain weather elsewhere. He upset the sales figures of the Stoddard-Dayton factory by taking one-sixth of the entire output while he was agent in Chicago. He left the McDuffee Automobile Co. in 1907 for New Mexico and came back East as soon as he could. Now, as assistant sales manager of the Willys-Overland Co., he is filling his second position with that company within a period of a few months. He was placed in charge of the Willys-Knight division of the Willys-Overland organization.

CADILLAC TRUCK ELECTS OFFICERS

Cadillac, Mich., Jan. 22—At the annual meeting of the Cadillac Auto Truck Co. the following were elected directors: W. A. Kysor, C. J. Helm, John P. Wilcox, F. O. Gaffney, Henry Ballou, Henry Knowlton, Perry F. Powers, J. C. Ford and D. B. McMullen. Secretary Helm's report showed more than 200 trucks had been made and shipped during the first year of the company's existence.

HOLD MOTOR CAR CLASSES

Grand Rapids, Mich., Jan. 20—A motor car school will be organized here under the auspices of the Grand Rapids Y. M. C. A., in which G. P. Sweet, manager of the United Motor Truck Co.; W. D. Vandear of the Reo agency; W. B. Austin of the Austin Automobile Co.; L. E. Colgrove of the Hudson agency; S. J. Barkwell of the Buick agency, and G. E. Northrup of the Ford branch will be interested as an advisory committee. The course will consist of twenty-four lessons on engines and eight lessons on trucks.

MOTOR PLANTS ARE MERGED

Bellefontaine, Ohio, Jan. 20—The merging of the Economy Motor Co. of Tiffin, Ohio, with the Bellefontaine Automobile Co. has been completed. The new concern will retain the name of the Economy Motor Co. and will move its factory here from Tiffin and manufacture pleasure cars. Officers elected are president, A. J. Miller; vice-president, R. W. Miller; treasurer, F. C. Spittle; secretary, Johnson West.

WILL INCREASE CAPITAL

Pontiac, Mich., Jan. 20—The Columbia Motor Truck & Trailer Co. will increase its capital from \$35,000 to \$100,000. Officers elected include: F. G. Clark, president and treasurer; Frank Carroll, vice-president, and Leigh Lynch, secretary. Other members of the concern are C. B. and Dave Wilson and J. H. Patterson. More than 400 orders already have been received by the company for 1917.

tion at first and then was made assistant sales manager a few months later.

Frank Trego recently has got himself into the strong spotlight by being an instrument in the organization of a \$5,000,000 company to make his large V-type aviation engines and by having himself made vice-president of the organization, which is the Springfield Motors Co. Before this he caused some talk about himself by his insistence on becoming an efficient transcontinental motorist. And he has written books about it. True, scarcely anyone believes any but Trego could make the cross-country trip at such a low cost, but no doubt his reputation is made for good. As for his engine, it is one of the largest ever built in this country.

Weber Had Unique Prestige

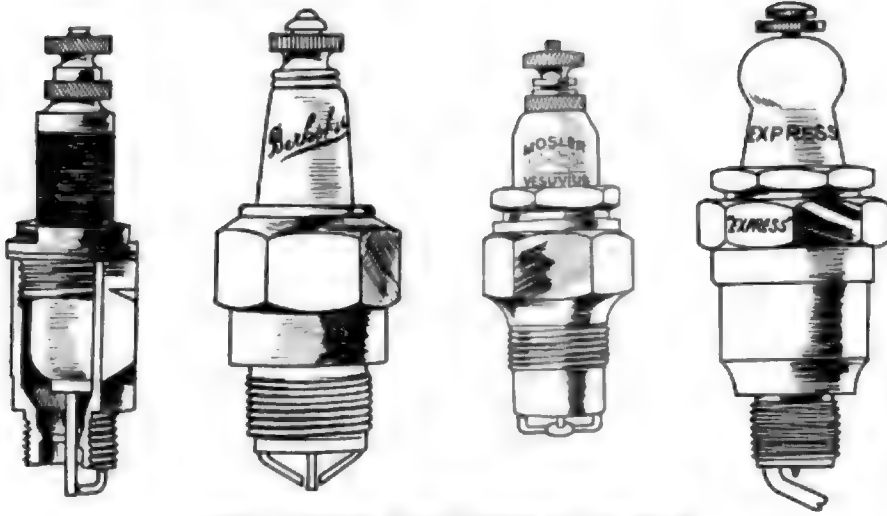
But Orlando Weber must have had the greatest prestige on the row. In 1905, for instance, he could claim the largest frontage of any motor car store in Chicago—and he did claim it. He it was who went to Europe, wandering around to see what he could compare adversely in the light of Chicago's already superior merits. He found that nowhere else was there such a row worthy of the name as that in Chicago, and he became the authority on rows from that date. While here he sold the Pope-Toledo.

Webb Jay had all the excitement of the agency business and the race combined. He was agent for two different cars at two different times and also was a track racer of danger to any competitor. He was one of Barney Oldfield's rivals in 1905 and almost got himself killed while racing. Now, his attention has been turned to lighter matters, such as vacuum tanks and gages, and he races no more. He also is interested in the recently organized Fageot Motor Car Co.

Several of these former row men have held territorial positions. C. F. Stewart was district sales manager for General Motors in Iowa after he was with the Benz agency on the row and before he went to the Bour-Davis factory. E. G. Kilborn was territorial wholesale manager of the Oakland Motor Car Co. of Michigan before going to the Liberty factory. E. W. McGookin went to Detroit for the Stewart-Warner corporation before joining the Springfield Body Co. M. D. MacNab was branch manager of the United Motors before he was with the Marion company.

Changes Are Well Distributed

Probably there are others than those mentioned here, but not many. And these changes are scattered over the entire period of the row's existence. The row takes men and it holds them. If the call from outside is urgent enough, some leave, but there are others who stay on in spite of outside calls. For this reason the personnel of the row does not change as much as might be expected in view of the lack of men to take charge of the work that deals directly with promotion.



Rootless, Berkshire, Mosler Vesuvius and the Express.

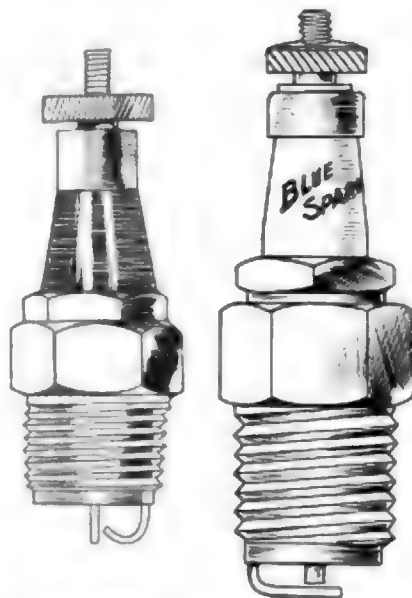
formation. It is said that the 1-in. firing surface will give a huge spark regardless of the age or condition of the motor. Bergie National Spark Plug Co., Rockford, Ill.

The Bosch Offering—The Bosch is an excellently machined spark plug selling for \$2. The insulation material on these plugs is stentite, an artificial stone which will not crack at any temperature found in a motor. The plug consists of three principal parts; a heavy central electrode, a single insulator and a steel shaft. All are made up as one piece. The three electrodes are of nickel alloy, heavy enough to withstand the most intense magneto spark. The knife edges of the electrodes are designed to present the least possible resistance to the current. Bosch Magneto Co., New York.

Few Changes in Benton Plugs—The retail price of Benton plugs is \$1. There are no radical changes in the standard types produced in 1916. Mica is the insulating material used and is wound spirally around the center electrode which is a rather expensive construction but one which is conceded to be very good. The demand for metric plugs of this make has increased steadily. There is a special plug for the Ford car and a variety of extra long types. L. F. Benton Co., Vergennes, Vt.

New 1917 Viking—The Viking spark plug is manufactured in all sizes and styles. The new model for 1917 is known as the High Speed type model 216. In addition an extra heavy type has been developed for farm tractor work. Porcelain, mica and genuine imported stentite make up the various insulators. Porcelain core models retail at \$1 and the mica at \$1.25. All types with stentite cores sell for \$1.50 while the farm tractor model with porcelain is listed at \$1.25 and with mica or stentite at \$1.50. The John MacGregor Co., Inc., Boston, Mass.

Rajah Plugs and Terminals—Rajah is making no new plugs, in fact, there has been no change for nearly 14 years. There has been a special Rajah made within the past season and continued which



The Kingston, a Kokomo product, and the Blue Spark

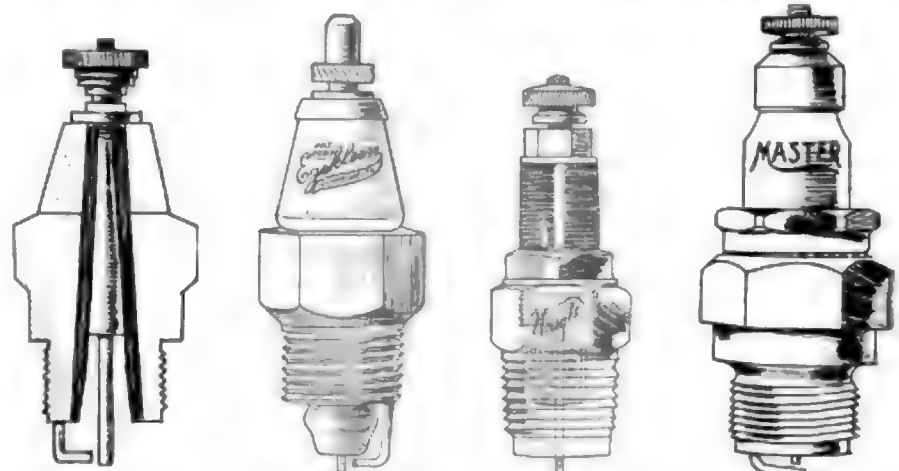
sells for \$5. This is the same as the standard stock plug except that the center electrode is made from special material and copper flanges are employed on the end of the electrode to radiate heat more quickly. These plugs are used in racing cars and

aeroplane motors. Porcelain is used exclusively for insulating material on all Rajah plugs. The material is the imported variety. Rajah Auto Supply Co., Blumfield, N. J.

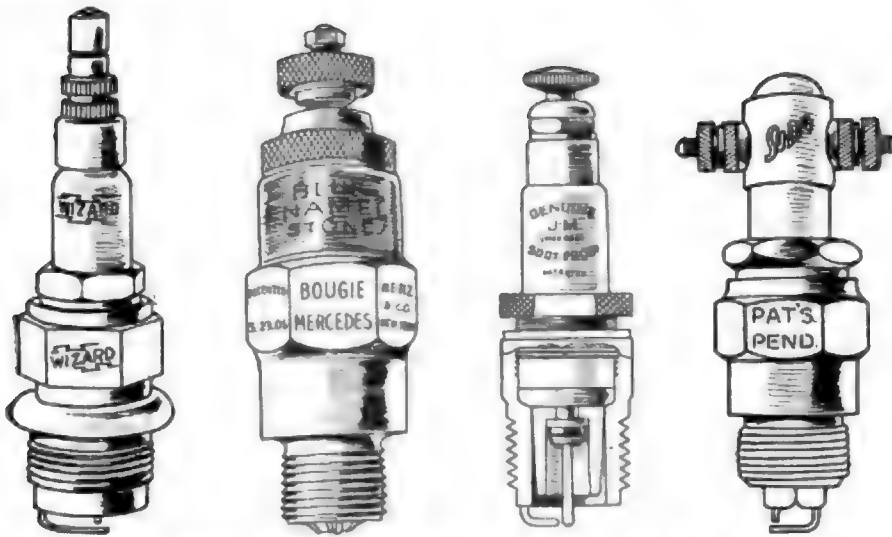
J.-M. Soot-Proof Plug—It is claimed that short circuiting is impossible with the J.-M. Mezger soot-proof plug. The use of a petticoat porcelain insulator results in a deep chamber between the center electrode and the porcelain and another chamber between the porcelain and the body of the shell. These chambers act as auxiliary combustion chambers, for as ignition occurs the compressed gas contained in these chambers is ignited and expands tremendously. The outrush of this burning gas has a scouring effect on the porcelain and prevents the formation of an excessive amount of carbon. These plugs are made in all sizes and retail for 75 cents. H. W. Johnson-Manville Co., New York.

The Auburn A. I. M.—These plugs are manufactured in the A. I. M. Auburn porcelain plug, the A. I. M. Auburn mica plug and the A. I. M. Blazer plug, in all types and sizes. The first two are insulated as named. The Blazer plug is insulated with freite which is a stone composition said to be 40 per cent stronger than porcelain and with double the insulating quality. Large quantities of these plugs in the metric sizes find their way to South American trade. Auburn Ignition Mfg. Co., Inc., Auburn, N. Y.

Star Booster and Priming Plugs—The porcelain in the Star plugs is made in two parts, thus relieving it of all strain due to assembly and making it substantial against breakage. The outside porcelain is very heavy and is held onto the body by a brass dome crimped over. A gas tight joint is made by the asbestos and mica washers. The electrode is baked into the removal porcelain and a flat-sided head is provided for holding while assembling. In the priming plug, the priming cup and wing nuts are made of brass. To prime it is only necessary to fill the cup, press down the spring and the gasoline will run down the plug around the electrode and over the sparking points. The price of this plug is \$1.



The Answer one-piece plug, the unique Ezekien, the Wright and the Master



The Wizard, the Bougie Mercedes Herz product with blue-enamelled stone, the J-M Root-Proof and the Fu-Dip

while the other types sell for 75 cents, 85 cents, 90 cents and \$1. Star Specialty Co., York, Pa.

Red Head Vitristone Plug—In order to meet the new conditions brought about by modern high-speed, high-compression motor designed to operate at the maximum allowable degree of heat with the plug located in the hottest part of the explosion chamber, a new Red Head has been brought out, known as Vitristone. Vitristone is a new type of vitrified stone. The product is made in the factory's own potteries and resembles material used in stoneware dishes which can be exposed directly to fire in an oven without cracking. These plugs are made in all sizes and shapes including a combination spark plug and primer and special types for Fords. Emil Grossman Mfg. Co., Brooklyn, N. Y.

Kopper King—A spark plug designed to be rust-proof and carbon-proof is known as the Kopper King. The heavy plating of copper prevents rusting of the shell and will not accumulate carbon because it is claimed that carbon will not adhere to cop-



Part section of the Benton plug

per plating. There is a generous thickness in all metal parts and the gaskets are copper-covered asbestos. These plugs are furnished with universal terminals and are made in all sizes. Three other plugs made by the same company are the Goliath, Mica Special, and Sharp Spark. The Sharp Spark Plug Co., Cleveland, Ohio.

Stewart V-Ray—A most recent addition to the Stewart line is the V-Ray plug. A distinguishing feature of the plug is the

four-point spark which insures an intense flame at all times. These points are of nickel-steel wire. Another important feature is the petriflant core which is non-absorbent and practically fracture-proof. There is a copper asbestos gasket between the bushing and the core, and an asbestos packing between the center electrode and the core. All plugs have the universal terminal cap which fits practically every type of cable terminal. To clean the points of this plug it is only necessary to slip the taper end of the terminal on the center point and turn with a little pressure. The rasp-like surface scrapes the points, leaving them clean. The price of this plug is \$1.00. Stewart-Warner Speedometer Corp., Chicago.

Efficiency Spark Plug—Efficiency spark plugs are manufactured in five different styles known as: Chieftain, Efficiency, A S C, X L, and Eagle. The Efficiency brand is made of the highest fire-test petticoat construction of porcelain only. They are made with both the center and shell electrode wires of the highest quality of nickel alloy of ample size to withstand continuous heat. The shell wire is in the form of a hook which allows the oil or condensation in the cylinder to gravitate to the lowest point. The Mogul plug made by the same company now known as the Chieftain, is featured by extra heavy porcelain and is made for high-powered six and eight-cylinder cars. Prices range from 75 cents to \$1.00. Gas-Motor Efficiency Co., Janesville, Wis.

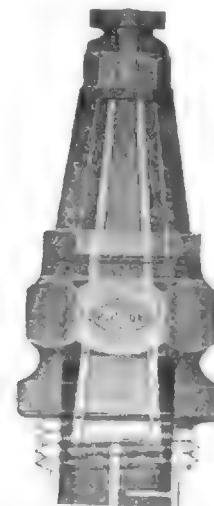
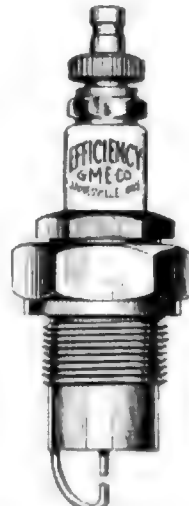
Reflex Plugs—Reflex plugs are made in twelve different styles, using porcelain and mica for cores. The principle difference in the types is in the construction and location of the electrodes. The baffle-type core is one of the interesting features of the line. This is used on the inclosed-end plugs. The shell is constructed to provide for an inclosed combustion chamber with a full circle spark gap in the end wall. Before the charge in the cylinder is ignited the gas enters the combustion chamber in



The new Randall Faichney Blitz plug with heavy insulator



The Champion X, with porcelain core and the Efficiency



The Splittorf has a hexagonal protector shell of green color

ley for \$33.50. With pulley and clutch they cost \$40. The No. 42 motor driven compressor is for tank filling and contains up to 50-gal. capacity. In regular form it sells for \$120. The No. 50 portable air compressor combines the electric motor, pump, and a 16-gal. seamless steel tank. It sells for \$130. This is mounted on a portable four wheel truck. There are outfits for varying needs. Brunner Mfg. Co., Utica, N. Y.

Crane Power Tire Pump—In the Crane single-cylinder power tire pump a special patented alloy packing ring is used instead of the piston rings usually employed in power tire pumps, the manufacturer stating that this ring is so arranged between the piston and the cylinder walls that leakage cannot occur and oil is prevented from getting into the compression chamber, and hence cannot reach the inner tube. Pumps can be supplied for any make of car and the work of installing may be done by the car owner, no drilling of holes or machine work being necessary. With hose and pressure gage, the pump sells for \$8.—Bay State Pump Co., Boston, Mass.

Yankee Pump—A hand pump for tires designed to be quickly attached to the running board and operated by a long lever is the Yankee pump. This has a large capacity and is designed to pump a tire in short order, the long lever providing for a minimum of labor. It comes equipped with gauge and hose and sells for \$5. Apex Electric Mfg. Co., Chicago.

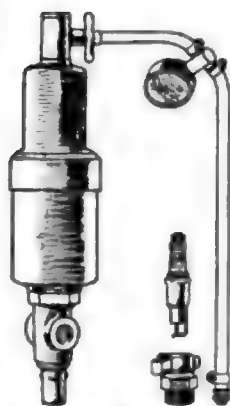
Automatic Air Station—A prepayment tire filling station for outdoor service or service inside the garage is known as the Eco. It is designed to operate on a nickel-in-the-slot principle, and does away with the need of a special operator, and makes the tire-filling feature self-supporting. Made by the Electric Appliance Co., Chicago.

Locks

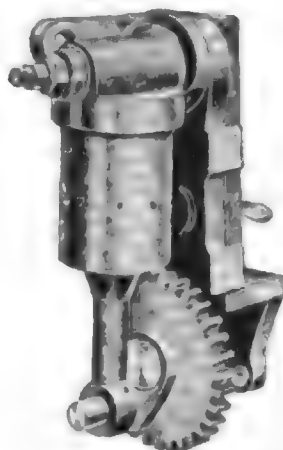
Pagel Combination Gasoline Lock—A motor car lock which prevents the theft of the car by cutting off the gasoline feed and with which no key is required, is the Pagel. It is on the combination principle such as employed in large safes and does not assemble a combination at the knob but operates beneath the floor board. It sells for \$4.50, and a special model for Fords for \$4. Turner Brass Wks., Sycamore, Ill.

H-R Neutrallock—A gearset lock which secures the gearset lever in neutral and which can be applied to either H-type gearshifts or ball gearshifts is the H-R Neutrallock. It locks automatically upon pressure of the foot or hand, and is unlocked with a key. The ball-and-socket type sells for \$7.50 and the H type at \$6.50. H-R Mfg. Co., Chicago.

Perry—This lock is unusual in that it throws the steering wheel out of action. When the lock is set it is impossible to control the wheels, the steering wheel spinning around freely. Thus the car cannot be



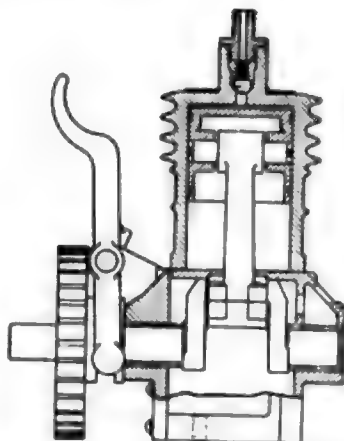
Brown spark-plug rings and special spark plug that may be used with it



Judd & Leland long-stroke pump

towed or driven away. The lock for Fords is a neat device which is placed directly under the steering wheel and is not in the way. For other cars the lock requires the substitution of a new steering wheel. The Ford lock sells for \$5. Perry Auto Lock Co., Chicago.

Mueller Ford Lock—A steering wheel lock for Fords secures the steering wheel to the housing of the post and thus prevents turning the wheels from a straight-ahead position. It is contained in a bronze case which is screwed to the top of the steering post housing in place of the regular gear cover and contains a central



Section view of the Manzel piston pump

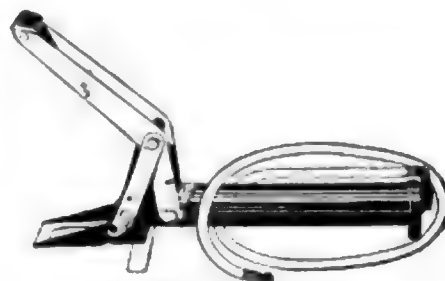
pinion and shaft which replaces the same part of the Ford steering gear. It is manufactured by the Reliance Mfg. Co., Chicago, and sells at \$5.

Miscellaneous

Mosco Motor Accessories—In the Bemus ball-contact timer for use on Ford cars, one of the many accessories in the line of the Motor Specialties Co., Waltham, Mass., contact is made by a hardened tool-steel brush engaging a steel ball with short, glancing impacts, both the brush and the balls turning each time so that fresh contact surfaces are continually engaged. The price is \$2.50. Another product is the Mosco wheel puller. The No. 2 puller is made for Fords only. The device, as illustrated, sells for \$1. Other wheel pullers working on the same principle for Overlands, Saxons, Buicks, Maxwells and Chevrolets sell for \$1.25 and \$1.50. The Mosco valve grinder is a hand-operated machine which is designed to impart an oscillating rotation to the valve while making a complete circle either way. The price is \$1.50.

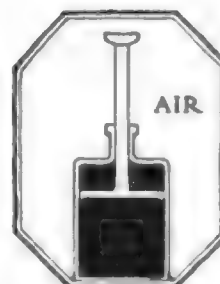
Johnson's New Products—To Johnson's wax, which has been on the market for some time, there have been added five new products. Johnson's cleaner is to take the scum and dirt from highly finished parts, after which they are polished with the wax. Johnson's Carbon Remover is a liquid placed in the cylinders and allowed to remain a short time for loosening and removing carbon deposits. Johnson's Black-Lac gives a rich waterproof black to all varnished surfaces and may also be used on tops with excellent results. Johnson's Auto-Lac is a body varnish, quick-drying, hard and lustrous, and easily applied. Johnson's Stop-Squeak Oil is applied to leaf springs with a stiff brush. It penetrates quickly and stops the squeaks. It may also be used for other squeaks between metallic parts. S. C. Johnson & Son, Racine.

Tuthill Titanic Lubricated Springs—Tuthill Titanics are made with a special lubricating rust-preventing compound made from graphite inserted between the leaves in the spring. It is designed to prevent spring breakage and stop spring squeaks. A feature of Tuthill springs is the hump in the middle of them by which they are held in place, thus doing away with the center bolt, and increasing their strength. Tuthill Spring Co., Chicago.



The Abbott foot-operating pump

JACKS



THROUGH a system of levers or a chain of gears sufficiently intricate, one man could lift the weight of the world. But it's enough for us when we can lift our cars with a light push of a lever. Jacks are as much a part of a car as the tires.

Tire Saving Jack—The Buffington tire-saving jack is easily adjusted to any height of wheel and it is claimed that the four jacks can be placed under the wheels in one minute. The part which comes in contact with the car is wood, provided with holes to raise and lower the blocks for different heights of wheels and with this construction there is nothing that can injure the paint. To operate them it is only necessary to place them under the wheel and push down the lever which lifts the tire off the ground. C. A. Buffington & Co., Berkshire, N. Y.

The Beard Wheel Lifter — Beard will continue the manufacture of the regular jacks with an added device which can be used as an all around instrument for storage and general repair work. It is entirely made of steel and is non-breakable. This jack operates on the hub of the wheel and

works by the simple process of pushing down on a lever with the foot. In the new jack the sliding bar is made double and slips over a standard clip which is attached to the bottom of the jack frame. Should one downward thrust of the lever not be sufficient to raise the load the proper height other lifts can be made by simply inserting cotter pins at the bottom end of the sliding bar and again pressing the lever down, thus making a higher lift. The Beard Auto Lift Co., Pleasant Lake, Ind.

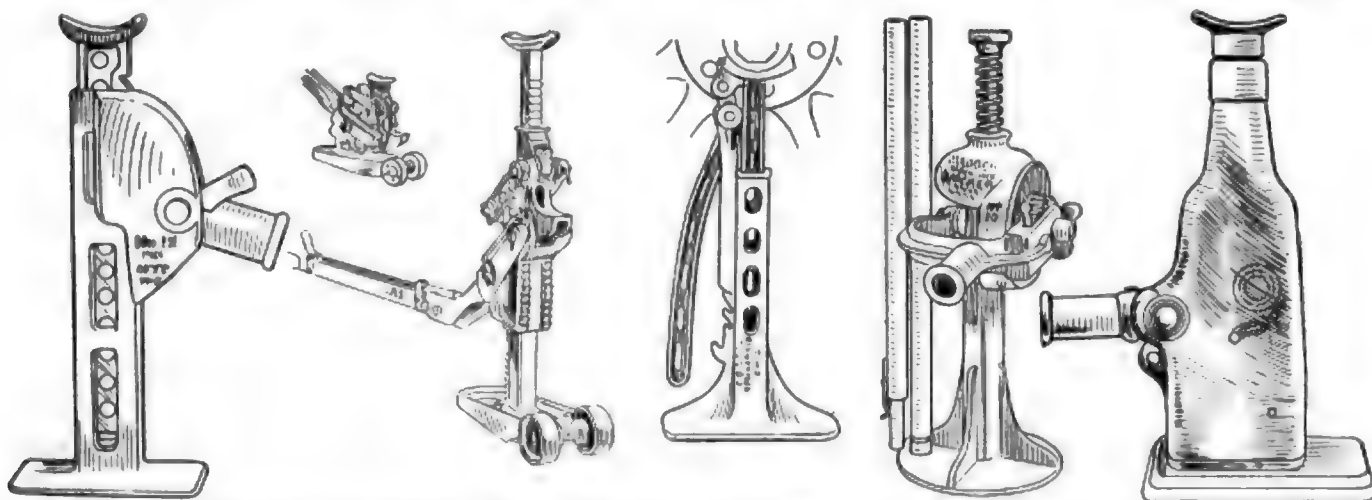
Device Easy to Operate—The Hartford jack is one of the easiest working made. An ingenious arrangement of gears multiplies the power so that 15 lbs. of pressure applied to its handle develops 1000 lbs. of lifting power on its rack. This means that it will lift with ease the heaviest of pleasure cars. The jack is finished in black enamel and comes in a handy canvas bag which keeps the dust and dirt away from it. Edward B. Hartford, Inc., New Jersey, N. J.

Jack With Long Handle—The Kimball ball-bearing jack overcomes the need of stooping over and applying great pressure to raise the wheels of the car. It is driven by bevel gears and fastened to the shaft

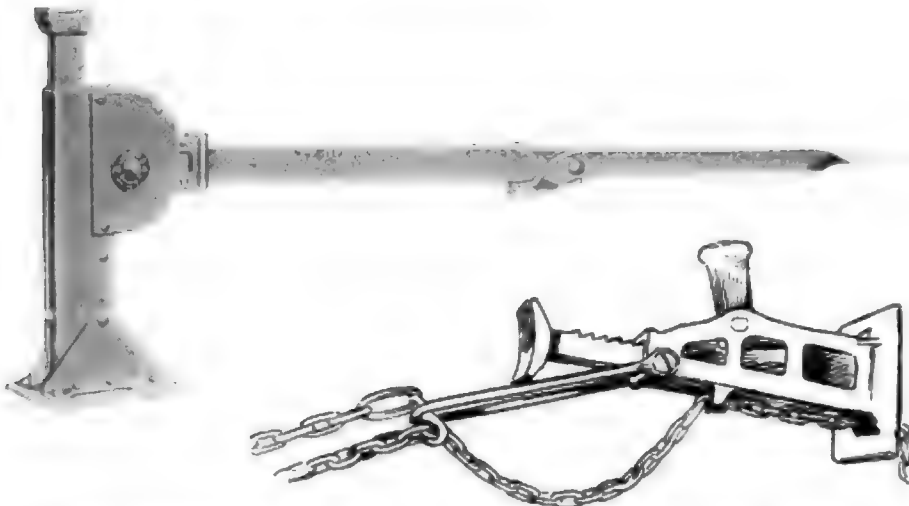
of one of these gears is a universal joint which is in turn fastened to a shaft which folds in three places and terminates in a cross handle such as is found in a lawnmower. The sectional arm and handle all fold together and fit compactly against the jack. This device is made in three sizes all having the ball thrust-bearing principle which makes for very easy operation. They sell for \$4.50, \$5 and \$5.50, depending on the size. Edward A. Cassidy Co., Inc., New York, N. Y.

The Eberhard Line—The numbers 9958 and 9960 Eberhard lift jacks will be continued in their present form as will also the number 9952 tire-saver jack. The number 9950 tire saver jack will be discontinued. The company will get out no new designs for this year, but probably will have something different for 1918. The Eberhard Mfg. Co., Cleveland, Ohio.

Weed Chain Jack—To operate a Weed chain jack it is not necessary to go down on the hands and knees to work the jack handle. To lift the car it is simply necessary to give a few pulls on its chain while one is in an upright position. To lower the car, simply pull the chain in the opposite direction. It operates on the same principle



The Jiffy jack No. 15, the Randall Patchney lifter, the Central tire saver, a new Badger screw jack and the new all-included Preteler



Above—the Lane jack has a long handle which is folded when not in use. Below—Pratt jack used as a tow



New type of Duff jack

as a portable hoist, which utilizes the chain principle. The jack has a strong cap providing a support from which the axle will not slip while a broad base prevents the jack from digging into soft roads and upsetting. There is an auxiliary step which may be fastened to the head which adds two inches to the height of the jack. The price is \$5. The American Chain Co., Inc., Bridgeport, Conn.

New Model Peteler — Moreau & Pratt have a new model jack ready for manufacture which probably will be produced in quantities by July 1. As yet there is no available information or illustrations of this new product. The present type of Peteler jack will be continued. Moreau & Pratt, Inc., New York.

Motor Car Turn Jacks—These jacks consist of an axle rest supported between two wheels and a long bent arm for inserting the turn jack and pulling the car with it. To turn the car around in a very short space it is only necessary to insert the axle rest under the center of the axle, push the handle down and pull the car around or to any desired location. The same type of jack is made up of a towing pole for towing cars by mechanical means and in a screw type to handle cars having low bumpers or extended overhanging rear parts. Allis-Smith Mfg. Co., Inc., Buffalo, N. Y.

Unique Tire Savers—A No. 1 and No. 2 Unique tire saver, and a No. 2 jack, U. S. products, will be continued throughout 1917. The manufacturers are now making patterns for a new jack for 1917 which will be on the market about March 1. The Unique tire savers as they are called are devices which lift a car very rapidly by the movement of a lever, and lock the jack up until the lever is released. U. S. Mfg. Co., Mansfield, O.

The DeLuxe Line — DeLuxe Standard and Leader jacks are of the rack and pawl type and of the bevel gear type, and are made in a variety of sizes. The line also includes a tire saver and garage jack which



One of the Hartford jacks, a Templeton, and a Buckeye rack and pawl

may be quickly adjusted to any height of axle, and then one pressure of the lever lifts the wheel from the ground. In the ratchet and dog types, slipping or dropping is prevented by an automatic lock. National-Standard Co., Niles, Mich.

Jiffy-Ratchet Types—This line comprises a complete assortment of ratchet-type jacks for all sizes and weights of cars. The No. 15 Ford type jack sells for \$1.25, and the No. 450 heavy-duty limousine jack retails at \$5. The mechanism in these jacks is well inclosed in a housing. Jiffy-Jax tire savers are of the universal type adjustable to any height of wheel and weigh but 25 lbs. per set. A set of four sells for \$6. The smaller type can be had for \$5. The Jiffy-Jack Co., Cleveland, O.

Barrett Products Continued — Barrett motor car and truck jacks will remain the same for 1917. These jacks for pleasure car use are provided with a foot lift of the sliding type which may be set instantly at any height on the rack to fit under the car axle. In operating the handle falls, working against a rack which lifts the jack one tooth to each stroke. The direction of travel up or down is controlled by a conveniently located reversing lever. The Barrett universal jack which is a fairly high-priced instrument selling at \$7.50 is automatically reversible and may be operated with strokes of any length. For cars which have overhanging truck racks, gasoline tanks or bumpers, this jack will

operate where one which requires a long full stroke, will not. The jack is automatically reversible. Duff Mfg. Co., Pittsburgh, Pa.

A Jack on Wheels—The Hovey jack utilizes the wheel and axle and the shifting fulcrum principle. The wheel principle is found in the movable carrier for the jack, this carrier being inserted by kicking up the removable head and depressing the handle. To let it down, of course, it is only necessary to lift the handle. Adjustment is made with the foot, and a handle 4 ft. long gives ample leverage. The whole device is made of malleable iron and open hearth steel. J. H. Whetstone & Co., Lapeer, Mich.

Jack Operated By the Car—In the Cady jack the carriage is adjusted to the height of the front axle of the car so that it clears everything under the car. It is only necessary to drive the car over it, and the front axle climbs upon a carriage by the momentum of the moving car. As the carriage goes up the front incline the rear of the carriage goes up the back incline, and raises the car, thus automatically lifting all four wheels, 1½ in. from the floor. Snow & Moore, Cleveland, O.

Three New Badger Jacks—The Walker Mfg. Co. is bringing out three new jacks for 1917 production. All 1916 devices will be continued during the coming season.

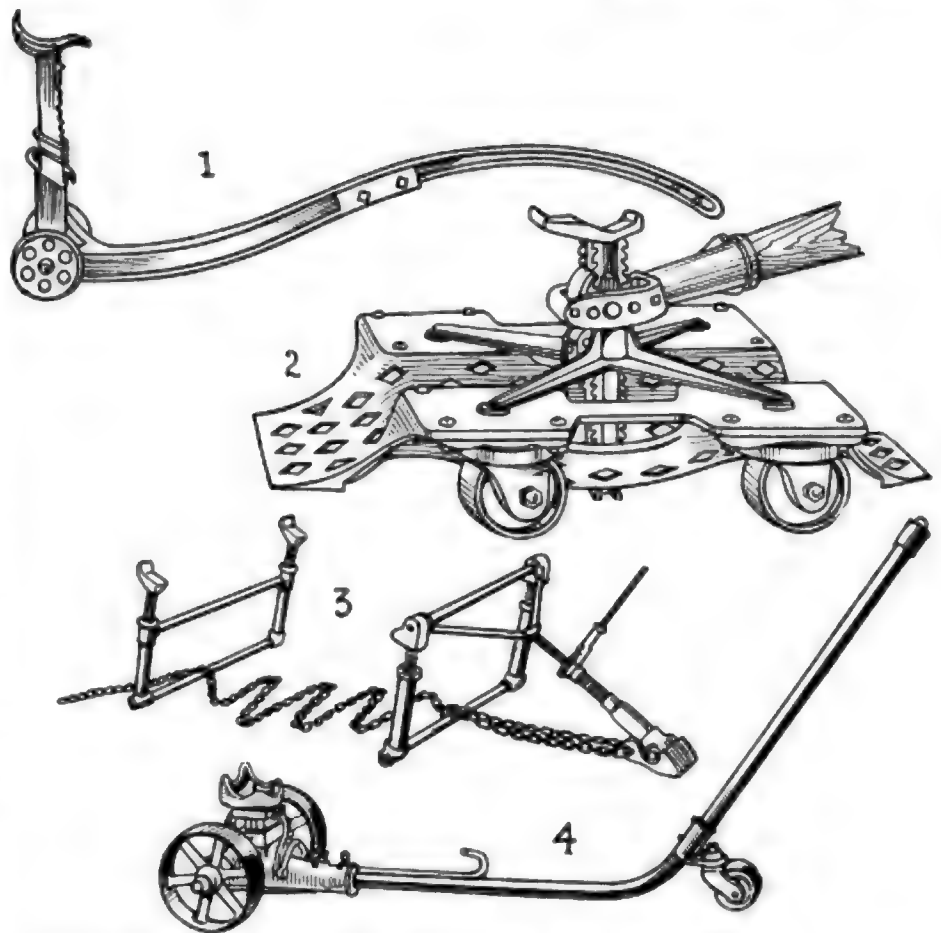
The Badger screw jack No. 10 supplies the demand for a device which by the use of a long handle can be set under the axle. This is desirable especially on the rear axle where the cars are equipped with overhanging tire carriers and gasoline tanks. Because of the leverage the long handle also makes an exceptionally easy lift. This jack has ball bearings packed in grease. A thumb nut allows a speedy adjustment of the jack up or down. Walker Mfg. Co., Racine, Wis.

Four Wheel Jack—The Four Wheel jack is a device consisting of two lifting units and a chain connection. The frames are tilted at an angle into the front and rear axles, while a powerful differential jack screw pushes the car forward a few inches, bringing the two frames into an upright position, in this manner elevating both front and rear of the car at the same time. Adjustments are provided for various axle clearances and wheelbases. When not in use the equipment is left on the floor of the garage. The car on entering, passes over it and it is only necessary to place the frames in position and turn up the jack screws. The Reading Automobile Co., Reading, Pa.

Handling Heavy Cars—The Excel jack is a heavy quick-acting device built to withstand the hard knocks of garage use. It is of the lifting handle type with a heavy base fitted with rollers for easy handling. One downward movement of the 50-in. lever raises the car instantly. There is an easily operated adjustment which fits the jack to fit any part of the frame or chassis. The jack will lift on any car up to 24½ in. without blocking. There is also a toe extension provided with a low lift of 4½ in., and a high lift of 15 in. The price is \$18. Randall-Patchney Co., Inc., Boston, Mass.

For Garage and Blacksmith Shop — Ekern stands find their biggest use in garages and blacksmith shops where it is always difficult to find anything to place under a car to hold it up when the axle or any part of the running gear has to be removed for repair. It is only necessary to jack the car up to the height desired, place a pair of these stands under the sill or frame of the car, and remove the part to be repaired. These stands are made of steel throughout and are light in weight, being only 11 lbs. each. They can be adjusted to any height from 20 to 37 in., and the price per set of two stands, \$6. Ekern Bros., Flandreau, S. D.

Jack With Tire Removing Attachment—The Peerless jack is regularly equipped with a tire removing attachment which consists of a hooked forging which is placed over the lifting head of the jack and hooked around the opposite of the rim. To remove the tire the swivel top is turned up against the casing and then the jack is operated in the regular way with a lever thus forcing the tire out of the clinch. This jack lowers by turning the handle,



1—Hovey garage jack. 2—Norwood combination jack, caster and turntable. 3—Four-wheel jack with automatic feature. 4—Allis-Smith turn jack

and it works equally well in any position. It can be used for pushing as well as lifting. The handle makes a good tire tool. The Oliver-Sampson jack is a powerful instrument which raises on the down stroke only and can be operated by hand or foot. It can be instantly tripped by throwing the handle up or lower automatically if desired. Prices range from \$3 to \$8, depending on the size. The Peerless jacks sell for \$3.50 to \$7. Oliver Mfg. Co., Chicago.

Tire Saving Jack—The A No. 9 tire saving jacks relieve the tire of the weight of the car when it is driven into a garage at night. These jacks are operated by one movement of the handle and are made of malleable iron with a leather-faced saddle so that no harm will be done to the paint on the axles. The price per set of four is \$8.75. The Central Brass & Fixture Co., Springfield, O.

Caster, Turntable and Jack—The leader of the Norwood line is a combination instrument consisting of a caster with four buttons on the top of the caster which are shaped to hold round ends of the base of a jack. The jack is operated with a long handle and has a very powerful leverage. One may use the jack alone or the caster alone, and if he desires to use both for higher blocking or permit dragging the car around, he can place the jack with the

four arms of the base into the four balls on the caster and the two parts become a unit. Automobile & Accessories Mfg. Co., Baltimore, Md.

Detroit Jack—The Detroit auto jack is an all steel device designed for use as a tire saver or for storing cars. To lift the wheel from the ground, it is only necessary to push down a lever with the foot. There is a simple adjustment for various heights of wheels and there is a padded swivel top which will not harm the paint. The price is \$6 per set of four. Auto Jack Works, Indianapolis, Ind.

Lane's H. C. Jack—The new Lane jack is a device easy to operate inasmuch as lifting of the car is performed by easy strokes from the long handle which reaches well away from the car or its equipment. The handle is collapsible in the center so that the whole equipment may be folded into a very small unit. Lane Bros. Co., Poughkeepsie, N. Y.

Simplex Jacks—The Simplex jack is made by one of the largest producers of this equipment in the country. It is made in a variety of styles and sizes, in fact, there is a type for every need in a repair shop or about a car. One of the leaders is the No. 45 geared type. This is a powerful jack of distinctive design and operates with the least possible effort, due to the unique gear construction. It is particu-

larly adapted to heavy pleasure cars or motor trucks up to 3-tons capacity. A readily attachable shoe is provided to increase the possible lifting height over 2 in. when desired. The price of this jack is \$9. Others sell for prices ranging from \$1.50 to \$6. Templeton, Kenly & Co., Ltd., Chicago.

Buckeye Jacks—Buckeye jacks in a variety of styles sell from \$1.50 to \$16. The line of motor truck jacks is one of the largest on the market and is suitable for all sizes from the lightest delivery vehicle to the largest truck made. These are made of malleable iron and heat-treated drop forgings. There is a spacious top on all the jacks designed so as not to mar or injure the paint. The jack of 5-ton capacity, which is the largest one in the line, sells for \$16. This jack weighs 33 lb. The midget of the line has a capacity of 1000 lb. and weighs but 3½ lb. Between these two are jacks designed to take care of all passenger car and truck work. All Buckeye jacks are of the rack and pawl type. The Buckeye Jack Mfg. Co., Alliance, Ohio.

Reliable Jacks—Reliable jacks for motor car use are built in the screw type and in the rack and pawl type. The least expensive screw jack sells for 70 cents and has a capacity of 1000 lb. Reliable truck jacks are built in several styles and are built in sizes up to 8-tons capacity. There is also a complete line of tire savers, all of which are readily adjustable for various heights of wheels, except the 20-Century tire saver, which is a very simple lever

and stand, selling for \$3.50 and \$4 per set of four, depending on the size. Elite Mfg. Co., Ashland, Ohio.

Eureka Jacks—Motor car jacks of both the screw type and the ratchet type as well as tire savers are incorporated in the Eureka products. One of the features is the long lever with a non-detachable iron handle to make quick and easy operation. Ashland Mfg. Co., Ashland, O.

Colt Jack—The Colt jack combines attractive appearance with simplicity in construction, sturdiness and light weight. A new form of U-shaped dog brings the leverage and support close to the bar, securing unequalled power for raising and lowering loads. This jack is double acting, raising the load with both upward and downward movement of the lever. By raising the shifter at the side it may be lowered in the same manner. The price per dozen is \$42. Batavia Clamp Co., Batavia, N. Y.

Weaver Twin Jacks—A combination of jack and garage truck by which cars may be moved around the garage or repairshop is called the Weaver Auto Twin Jack. It puts the car on casters and is made in two sizes. The lighter has 4,000 pounds capacity and is \$20 for two; the heavier is for 8,000 pounds capacity and sells for \$36 for two. These are the product of the Weaver Mfg. Co., Springfield, Ill.

Pneumatic Jack—The National Air Jack is a portable jack which operates by air pressure. It is operated by the hand tire pump, the motor-driven tire pump, etc. It sells for \$6 and is made by the National Motor Supply Co., Painesville, O.

Miscellaneous

Radiator Heat Indicator—A new device to indicate automatically temperature conditions of the cooling water and thus the proper operation of the engine is the Auto Block Signal which attaches to the radiator cap and consists of a big red dial that turns jet black when the cooling water temperature becomes warmer than normal. It can be attached in 3 minutes and sells for \$5. Auto Block Signal Co., Chicago.

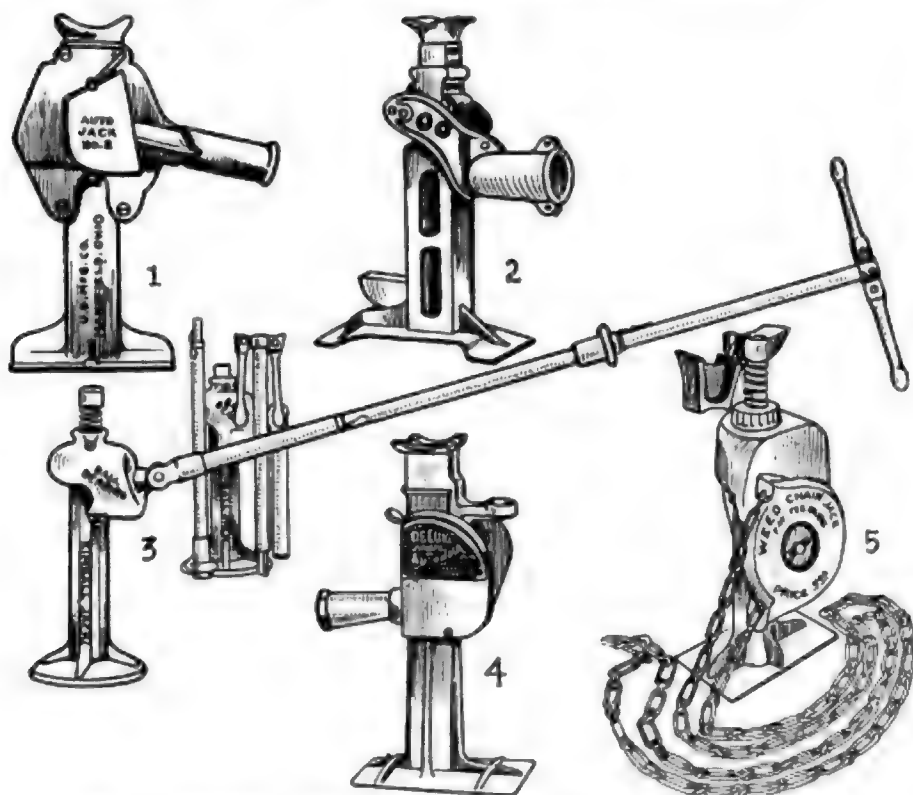
Ad-E-Lite Carbon Remover—This is prepared for the purpose of easy application to the engine without the necessity of tearing down the motor. When used about every 1,000 miles it is stated that it prevents the formation of carbon deposits. Adams & Elting Co., Chicago.

Akron Williams Tire Repairs—A complete line of equipment for tire repairmen is one of the features offered by the Williams Foundry & Machine Co., Akron, O.

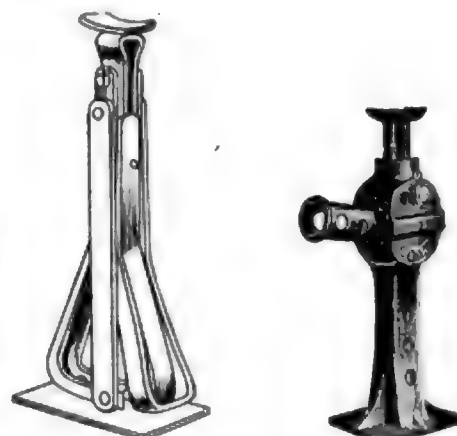
Locktite Patches—A cementless tube repair patch with which it is claimed the entire operation of preparation and patching of the tube can be performed in 5 minutes, and which requires neither heat, cement or special tools is the Locktite, made by the Locktite Patch Co., Detroit. An outfit for fifty repairs costing 50 cents.

Friestedt Rim Tool—A device for rendering easy the application of tires to split rims is the Friestedt rim contractor which opens, contracts and relocks the rims instantly. It is automatic and quickly attached. It is arranged so that when contracted the rim can be held in such a position. Friestedt Rim Contractor Co., Chicago.

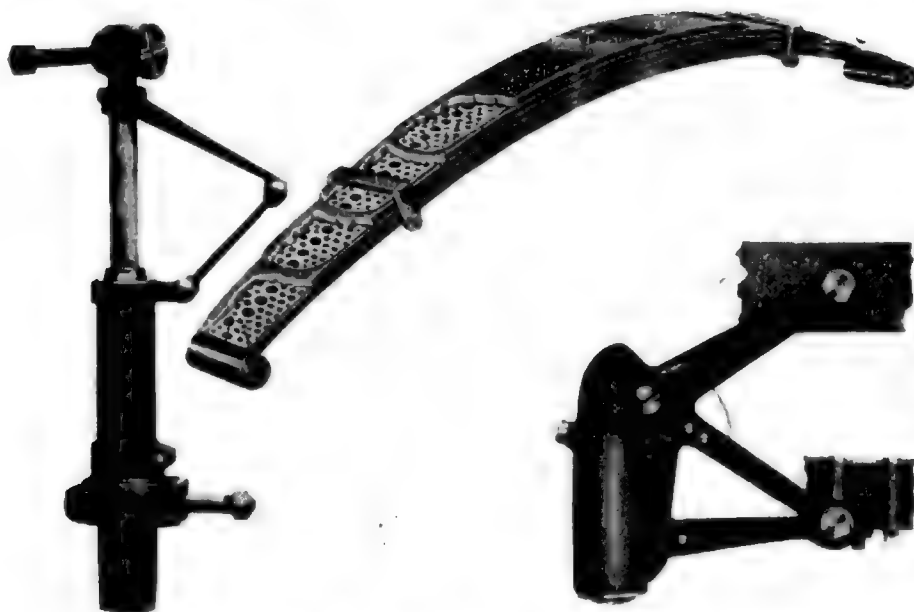
Celluloid Cleaner—Motor Age has had so many inquiries for methods and preparations for cleaning the celluloid light in curtains that it is pleased to tell of a new product recently put on the market for this purpose. This is known as C-E-Z Celluloid Cleanser. It is very easy to apply and is prepared to remove discolorations, dirt and light scratches from the celluloid. It is made by the Celluloid Cleanser Co., Chicago.



1—U. S. Auto jack. 2—One of the Oliver jacks. 3—The ball-bearing Kimball screw jack. 4—The De Luxe, a National Standard product. 5—The Weed chain jack



Auto Jack Wkn. wheel puller and Colt's A.V. jack



Left—The Naco plunger and lever instrument. Center—Showing application of Dunn insert. Right—The Landis piston-in-liquid shock diffuser

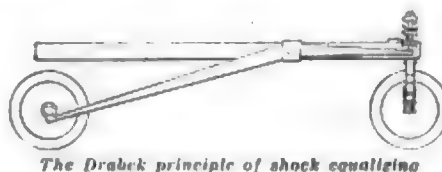
turn connected with the frame of the car. The double type sells for \$4.50 to \$12, depending on size, and the single strap type sells for \$3.00 to \$7.50. There is a special type for Ford cars in which the clamp is secured to the L-shaped longitudinal frame bars and from there cross-ways running to the rear springs. The strap is tightened then around the rear axle. These cost \$4.50 a pair. H. & F. Mesinger Mfg. Co., New York.

Velvet Shock Absorbers—A new Velvet model is being brought out this year for half-elliptic springs such as are used on the Hudson, Hupmobile, Chandler, Haynes, and others. The sliding motion is in exactly the opposite direction from the absorber used on the three-quarter elliptic springs. Although they are of different style from those on three-quarter or platform springs, they have the same size framework and housing. The strength of coils and bolt holes vary according to the weight and make of car. There are three models manufactured. The Model C is made of phosphor bronze and nickel-plated. The Model E is all black and made of malleable iron. Otherwise it is exactly the same as the Model C. John W. Blackledge Mfg. Co., Chicago.

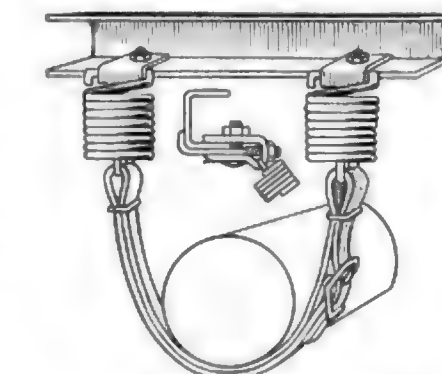
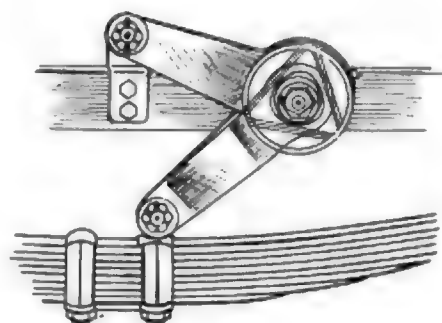
Halladay Flexlevers—These shock absorbers are made especially for use on Fords. It is claimed they can be attached in 30 min. without having to remove the rear wheels or spring hands, or doing any machine work whatever. They are fully equipped with shackles and bolts. The flexlevers for heavy cars are designed especially for the make of car on which they are to be used. Patterns are now in stock to fit practically all cars having three-quarter elliptic springs. Another Halladay product is the type 4 shock absorber which is of the barrel type fitting on the rear of the springs. This latter sells for \$10

per pair. The heavy-car type flexlevers sell for \$25 per pair and the Ford type flexlevers \$10 for a set of four or \$6 per pair. L. P. Halladay Co., Streator, Ill.

Landis Shock Diffuser — The Landis shock diffuser consists of a liquid containing a casing in which is a floating cylinder



The Drabek principle of shock equalizing



Above—The Connecticut cam and flat spring type. Below—The Mesinger double rebound-check spring

having a limited movement on lugs. In this cylinder is a piston fastened to a connecting rod which rod is fastened to a leverage principle with one arm pivoted to the upper spring frame or body of the car and another arm pivoted to the lower spring or axle. It is claimed that the device does not interfere with the compression of the spring and introduces a time element of resistance to the spring coil in proportion to the speed of the spring action. It does not place additional tension upon the spring and has no neutral points in its action. Landis Engineering & Mfg. Co., Waynesboro, Pa.

Connecticut Shock Absorber—The Connecticut shock absorber is of the V-type with steel springs of the flat type for resistance. One arm is integral with the case containing a triangular set of springs, and the other is attached to a three-faced cam which revolves between the springs. The devices are set so that the springs of the absorber are slightly deflected, permitting unrestricted motion of the cam in one direction, but checking the movement in the other direction. Thus, the springs of the car may perform their function of taking up the inequalities of the road and at the same time reaction is checked. Special adaptations of the same type are made for use on Fords. The price of the complete Ford set is \$15. Connecticut Shock Absorber Co., Meriden, Conn.

Gabriel Snubbers—The familiar Gabriel Snubber consists of a rubber strap, one end of which fastens around the axle, and the other end of which is coiled around two semi-circular pieces which are held away from each other by a coil spring. A shell surrounds this coil assembly, inclosing it. The effect is to eliminate rebound by a gradual tightening on the strap due to the contraction of the leather coil against the central spring. A number of improvements have been made in these recently as regards facilitating the attaching of the snubber upon the car. There is an improved type of belt clamp which makes it unnecessary to make any holes in the belt to apply the clamp. Gabriel Mfg. Co., Cleveland, O.

Twin Spring for Fords — The Twin Spring is a supplementary spring instantaneous in its action. When applied to a Ford they not only leave the leaf spring free to perform the work for which they were designed, but they assist them to perform that work, it is claimed. When applied to Fords they are fastened with the coiled section in the direction of the spring. They are also applicable to cars with three-quarter elliptic springs being fitted on the spring ends. The price per set is \$10. Twin Spring Co., Boston, Mass.

Flentje Recoil Preventer—The Flentje is an automatic oil and air cushioning instrument. A most important improvement in the 1917 model is the application of three studs riveted to the valve and a

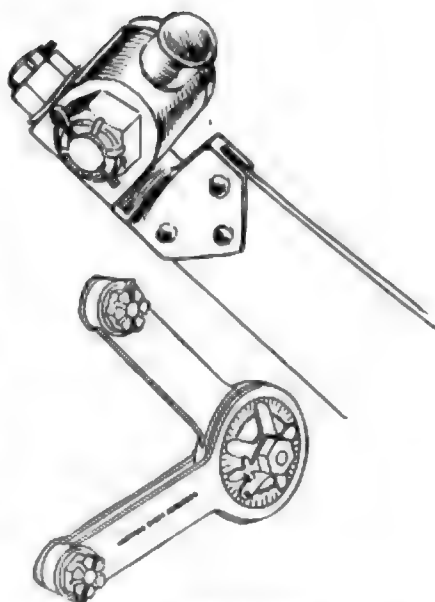
spring around the studs resting inside of the cylinder. The spring extends a little above the piston allowing a perfectly free action over good roads and at the same time vaporizing the oil and air more quickly. All fiber washers have been eliminated. The pressure exerted on the valve through the oil and air cushion by recoil and side sway closes all open piston ports automatically. Then the vaporized oil and air pass through a bypass in the piston rod through the bottom, checking all recoil or side sway automatically from 1 to 10,000 lbs. Ernest Flentje, Cambridge, Mass.

Hartford Shock Absorbers—In addition to making the regular type, Hartford will also have what is termed a semi-universal end shock absorber. This will be applicable to spring ends and in the eyes of the makers will offer many advantages not found in the conventional end types. The Hartford friction shock absorber which works between the spring centers is too familiar to need a detailed description. One of the characteristic features is the ease with which it may be adjusted from the outside on a calibrated adjusting dial. Edward V. Hartford, Inc., Jersey City, N. J.

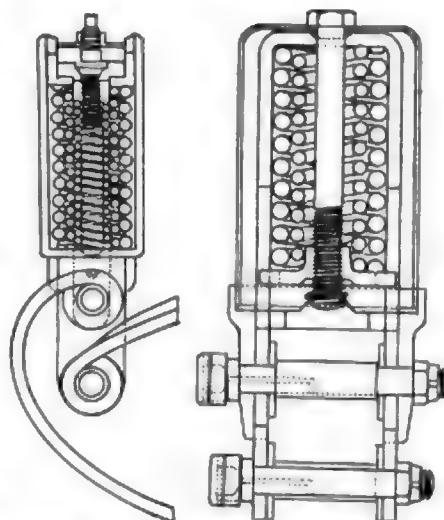
C. C. Shock Absorbers—The C. C. end type shock absorber has a triple cushion spring combination of forty coils on each absorber. The largest diameter spring is stiff, and has the work of absorbing the heavy jolts. The small diameter spring is limber to extinguish the vibration, while the middle spring co-operates with the other two and provides additional resilience. At the extreme bottom of the spring gauge is fitted an accurately machined piston 2 in. in diameter which slides smoothly in the cage and maintains a perfect bearing on the entire length of the action. There are grease cup attachments with handle feed screw caps, and grease holes to afford thorough lubrication. They sell at \$4.50 per set of two, and \$3 per set of four. Cox Brass Mfg. Co., Albany, N. Y.

Naco Products—The general construction of the Naco shock absorber has not been changed in the least. However, the present type has ball and socket attaching arms in place of the old type. The No. 3 absorber takes any car up to 3,000 lb. and sells at \$25 for a set of four. One arm seats in a bracket attached to the axle, and another arm in a bracket attached to the frame. There is a nut adjusted so as to cause slight expansion of a split piston. The severity and retarding action of this mechanism is readily adjustable. If the car hits a rut or obstacle which would ordinarily cause an excessive jolt all violent action is overcome through the action of the cam lever and link which produce an expansion in the piston. National Appliance Co., Cleveland, O.

Hassler Shock Absorbers—The Hassler absorber for Fords is made up of a spiral conical spring of chrome vanadium steel



The Hartford friction-type shock absorber and view of the recently introduced arm support



Two spring and plunger shock absorbers, the Cox and the Stone

which is bracketed to the leaf spring and to the axle, one for each wheel. The load of the car compresses the spring, so at the slightest jolt it instantly comes into play. The conical spring is placed at such an angle that side sway is prevented. On the axle side of the swinging arm is fitted a lever which bumps against the axle should the obstruction in the road be so excessive as to cause throw. The complete set is listed at \$15. Robert H. Hassler, Inc., Indianapolis, Ind.

Drabek Equalizer—The Drabek equalizer is an original adaptation of the lever for purpose of shock absorption. It is attached to the chassis by one point on each side, which point is one-quarter distance from the front end of the car and three-quarters distance from the rear end. There are two levers extending from the rear axle through this support to the front of the car where the ends are suspended on a plunger which operates a coil spring. Thus,

all vertical movements of the rear wheels which are attached to the long arms of the lever and which are the main weight carriers, are transmitted to the forward end of the car through the short arm of the lever where the jolt is reduced exactly in proportion to the proportional length of the arms. Thus, if the wheels run over an obstruction which is 1 in. in height, the motion transmitted to the car through the fulcrum and the short arm of the lever is only about $\frac{1}{4}$ in., which is easily absorbed by the helical springs at the forward end of the short arm. With this device rear spring suspension is unnecessary. The Drabek Equalizer Co., Cleveland, O.

H. & D. Shock Absorber—This shock absorber is designed for use on Ford cars. It consists of a lever suspended between the spring and the axle with a rocker suspension. This lever extends back of the axle and from its end is a strong coil spring which is fastened at the center of the car. Of course, all jolts and jars, no matter how small, are conducted to this coil spring. The price per set of four is \$10. H. & D. Co., Inc., Goodland, Ind.

Buckeye Eliminator—Buckeye DeLuxe shock absorbers are adapted for use on Ford cars. The spring shackle carries a plunger which operates a series of coil springs within a suitable shell. This shell is supported rigidly to the axle. Thus a very sensitive shock absorber is created. The shock eliminator for use on Fords is a strap and spring type. The springs are supported to the frame on each side of the axle and are connected by a strap which runs under the axle thus catching the rebound. In the front suspension the spring is fastened to the axle and two straps. There is another type built for use on Overland, Studebaker, Hudson, Maxwell and Dodge cars. This is the coil spring type also. The company also makes shock eliminators for all types of cars which have a spring supported to the frame and from the spring, a strap supported around the axle. The Ford DeLuxe type sell at \$10 for a set of four. The Ford eliminators sell for \$4 per set. The all car shock absorber for \$12.50 per set and the all-car shock eliminators at \$4. The Central Brass & Fixture Co., Springfield, O.

Johnson Shock Absorber—The Johnson shock absorber has a spring recoil check. It is fitted with an adjustment giving a wide range, allowing the absorber to be fitted to the pound on cars of various weights. When a Johnson shock absorber is installed the spring shackles are removed and are replaced by 115 in. of highly tempered coil spring. A new feature in the device is a coil spring with reversed action which serves as a recoil check. Elliptic, semi-elliptic, three-quarter elliptic or platform springs can be fitted. Triple Action Spring Co., Chicago.

Dann Insert—Although really not coming under the head of a shock absorber it

is fitting that Dann insert be placed in this list because it is not only a protection against spring breakage and a sure means of oiling the spring, but also makes the springs so flexible that it really serves the purpose of a shock absorber. With the perfect acting spring the initial heavy shock is divided into a series of little harmless movements. When the spring leaves are all working perfectly, the shock is dissipated throughout their entire length, and is practically absorbed in the spring motion without pounding away at the car itself. It is this function that the Dann insert is said to put into the spring. Dann insert is a lubricated bronze spring-leaf bearing. Very thin sheets of bronze are put between the leaves, and these sheets are impregnated throughout their length with graphite packed into small holes. Dann Products Co., Cleveland, O.

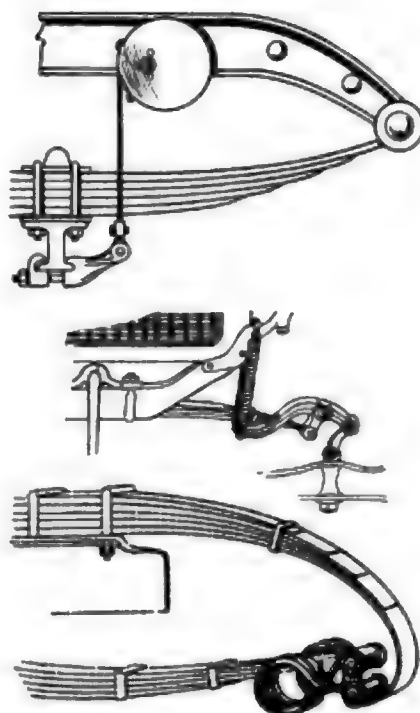
Walker—A supplementary spring inclosed and with flat coil spring of tempered alloy steel. The shacklebolts are furnished with grease cups. Price, per pair, \$15. Fordzer shock absorbers are supplementary spring type; all parts are dropped forged, bearings are bronze bushed and grease is held in felt washers. Springs are flat vanadium steel. Price, \$7. Walker single cam lever springs consist of a coiled spring attached to a long lever arm which is pivoted to the axle and the spring shackle. Price, per set of four, \$5.50. Double cantilever springs in which two coiled springs are employed instead of one, sell for \$8 per set of four. Walker Mfg. Co., Racine, Wis.

W. & C.—These are designed for Fords, and consist of two rather long, curved arms, one for each end of the leaf spring. The arm is pivoted in place of the shackle and attached to its end is a long coil spring which is anchored to the frame adjacent to the starting crank. Philip H. Webber & Co., Hoopston, Ill.

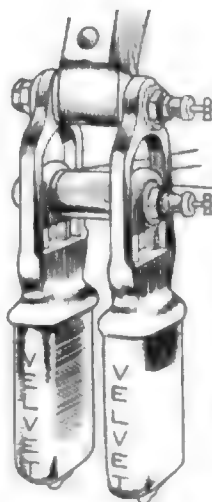
D-M for Fords—A special shock absorber for Fords of the double arm type is the D-M which sells for \$10 per set. The double arm feature insures proper balance and decreases the wear on the bolts and bushings. However, as the bolts have self-lubrication facilities and the bushings are of steel the wear would be slight in any case. These are the product of the D-M Shock Absorber Co., Kentland, Ind.

Duplex—This is special equipment for the Ford, and is intended to give a cantilever spring effect, and also an underslung effect of riding. It consists of a long arm, one end of which is attached near the center point of the Ford transverse spring, and the other on a steel bearing, which is bolted to the axle. Near this end the arm carries on a conventional type of shackle, the free end of the Ford spring. Price, \$15 per set of four. Duplex Cantilever Spring Co., Chicago.

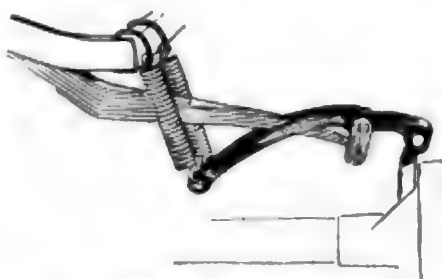
Flexible Rider—A Ford shock absorber which is really a supplementary spring is the Flexible Rider. A long coil spring at-



Above—The Gabriel rebound snubber. Center—Wright lever and spring type for Fords. Below—Twin spring shock absorber attached to a three-quarter elliptic



The Velvet twin type for application to the rear of the springs



The Aitchandee lever and spring instrument as applied to a Ford

taches to the central point of the Ford spring, the other end attaching to the end of a long arm whose body is interposed between the Ford spring shackle and seat. It is designed to cushion the action of the Ford spring. It gives a cantilever effect to the suspension. Hollowed steel grease bolts and grease cups are incorporated. Price \$10 per set of four. R. R. Mfg. Co., Elgin, Ill.

Miscellaneous

Buick Gearshift Lock—A device specially designed for Buicks and which will lock the gearshift lever in neutral, renders it impossible to drive the car, although it may be moved about for convenience in the garage. This incorporates a Yale lock and sells for \$6.50. It is made by the North Side Buick Sales Co., Chicago.

Kimball Protectors—Kimball tire protector, a flexible, steel-covered leather cover for tires has been on the market for many years. It protects the rubber tread of the tire from cuts and punctures. As a blow-out protector it can be used in sections. Kimball Tire Case Co., Council Bluffs, Ia.

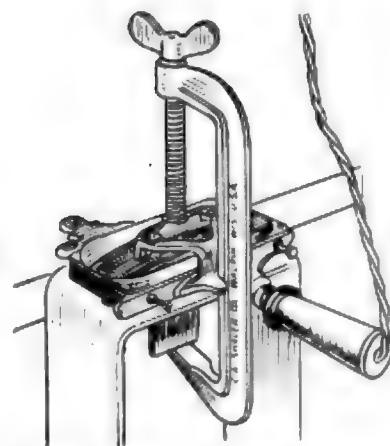
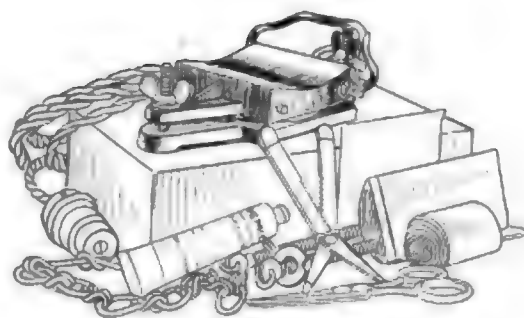
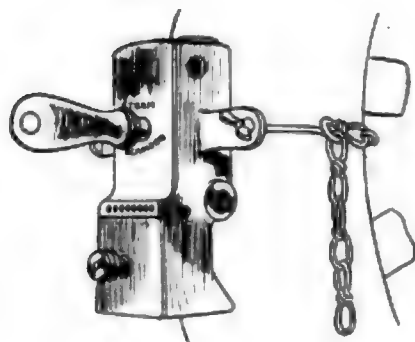
Kimbal Mud Chain—Mud chains designed to give the wheels traction in slippery places are made by the Kimball Tire Case Co., Council Bluffs, Ia. Their quick attachment is a feature, the statement being made that they can be put on with one hand while the operator is standing on the runningboard.

Kamlee Touring Trunks—Touring trunks for attachment to all makes of cars are marketed under the trade name of Kamlee. A feature is the Kamlee Packard Touring Outfit which is built in eight units, comprising runningboard, fender and spare tire trunks, etc. It offers carrying space for a complete wardrobe and equipment for a large party. Kamlee Co., Milwaukee, Wis.

Staude Glare Stopper—A disk of heavy amber glass arranged to be clipped to the edge of the windshield in such manner that the driver can look through it by moving his head a little to one side when facing glaring headlights of an approaching car, is called the Staude Glare Stopper. The price is very low. It is made by E. G. Staude Mfg. Co., St. Paul, Minn.

G. L. W. Spring Oiler—A permanent attachment for springs which automatically provides inter-leaf lubrication is the G. L. W. spring oiler. This consists of a rust-proof metal case and felt pad snapped over the main leaf of the spring, and forms a reservoir for lubricating oil. These retail for \$20, and are marketed by Hudson Sale Co., Chicago.

Self-Oiling Springs—To operate properly, vehicle springs should be lubricated at regular intervals, and these springs are so made that lubrication is simple. Each spring leaf has a small depression made in the end so that oil can be applied with an ordinary oil can. Triple Action Spring Co., New York and Chicago.



The Marvel generates steam from a small gas pot. The Premier is a diminutive electric portable device. The newest Shaler is known as the Five-Minute vulcanizer—reading from left to right

outer casing may be made without removing the tire from the wheel. The complete outfit consists of the vulcanizer and rheostat mounted on a clamping board, two canvas attachment straps, a thermometer and 15 ft. of flexible cord with separable attachment plug. The heating element consists of a standard Westinghouse ribbon register well insulated and assembled between two vulcanizing plates. The canvas straps are used for clamping the vulcanizer on the casing. Westinghouse Electric & Mfg. Co., Pittsburgh, Pa.

Lazarus Portables—The same type of portable vulcanizers of this make will be continued for 1917. These are made in two sizes, one for all size tires retailing at \$2.50, and one for Fords and motorcycles at \$1.50. The vulcanizer is entirely automatic in operation. The concave surface fits all size tires and the inclosed flame permits its use in a garage with safety and at the same time allows it to be used on the road, inasmuch as wind has no effect on the burning. Lazarus Mfg. Co., Cleveland, O.

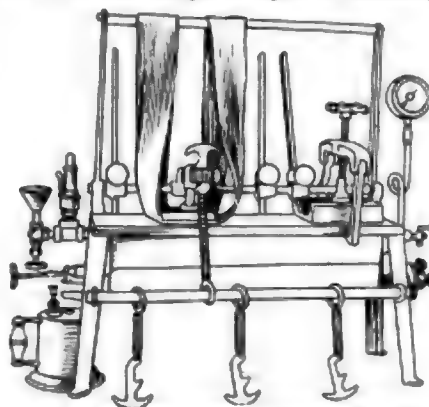
Lawall Handy Vulcanizer—The Lawall vulcanizer is a portable device for use directly on an inflated casing or for outside tube repair. This is direct operated by burning gasoline, having a closed but vented combustion chamber. It requires only ¼ ounce of fuel and is so arranged with a shallow basis and deep narrow well that the fuel in the shallow basis is consumed and brought to the proper heat in 1½ min., after which it is kept at the proper heat by the flame fed from the narrow well. The price is \$5. Lawall Vulcanizer & Mfg. Co., Richmond, Ind.

Superior Outfits—The Superior No. 3 vulcanizer which is new is designed especially for 3½ and 4 in. tires and tubes. This machine is very similar in appearance to the present No. 1, the main difference being that the mould is deeper so as to accommodate perfectly the 4 in. tires, which is not possible with the No. 1 machine. The mould is 10 in. long and 7 in. in circumference. A single burner kerosene stove is furnished or a gas burner if desired, at the same price. This new machine sells com-

plete with all equipment for \$20. The garage outfit is also new for 1917. This is a much larger machine, with double kerosene burner and is designed for any repairs on casings of 4 in. size or larger. Any sizes of inner tubes can be repaired with this machine. The price is \$25. Superior Vulcanizing Co., Rochester, N. Y.

Meiser Quick-Action—The Meiser Quick-action vulcanizer operates from the lighting system of the motor car from the ignition generator on a Ford, or from 110-volt A. C. or D. C. city circuits. The vulcanizing element is contained within the cylinder, attached to which is a bracket which supports chains that are fastened underneath the rims to hold the vulcanizer solid to the tire. Casings are thus vulcanized without being removed or deflated. All patches are started cold and there is no waiting to cool for the second patch. It is said that the vulcanizer reaches 265 deg. almost instantly. The price is \$7.50. G. H. Meiser & Co., Chicago.

Midland Portable—The Midland Portable vulcanizer is gasoline operated, and may be applied directly to the inflated casing. There is a concave vulcanizing face which fits anywhere on any size tire. There is an open water jacket between the fire and the tire which prevents the tire from burning. The steam generated, however, is not under pressure. There is a steel protector hood which is a windshield and a double safeguard against scorching



The completely equipped Champion steam vulcanizer

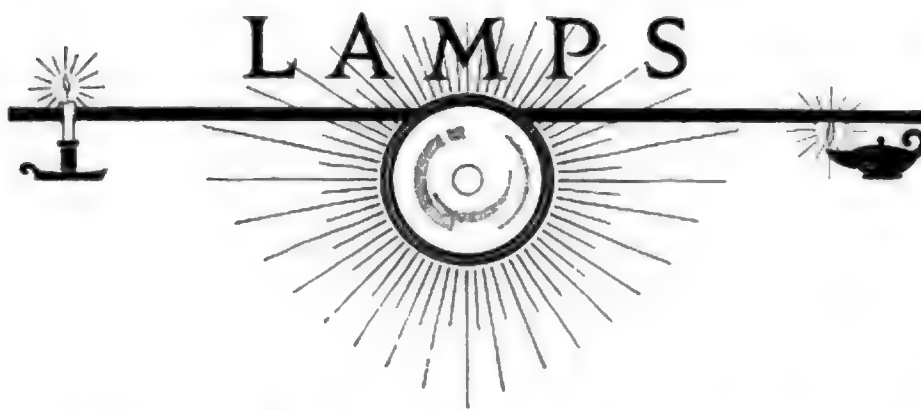
the tire or fender. At the side of the burner is a longitudinal slot which insures a uniform draft and provides for overflow of the fuel, insuring the correct amount which extinguishes automatically. Midland Supply Co., Davenport, Ia.

Vulcar New Process—The Vulcar is said to be the only portable vulcanizer which supplies moisture to the rubber while it is being vulcanized, thus preventing burning or overvulcanizing of the rubber. It is operated by an alcohol burner which is extinguished automatically at the end of 15 min., which is just the time required for proper vulcanizing. It sells complete for \$7. The National Rubber & Specialties Co., Cincinnati, O.

Marvel Junior—The Marvel Junior vulcanizer is a clamping device utilizing a chemicalized disk. It is only necessary to touch a match to this disk and the correct amount of heat is given for the repair. The heat is directed to the patch only and the operation is not affected by the wind. There are six patches and six disks in the equipment of each vulcanizer. The price is \$1. The Marvel Senior vulcanizer for repairing tubes and casings also has a chemicalized heating element, but the whole device is larger and a bigger capacity than the Junior. The price is \$2. The Marvel Accessories Mfg. Co., Cleveland, O.

Five Cavity Vulcanizers—Miller is now putting on the market two new styles of five cavity vulcanizers, one being of the solid type cast in block, and the other having movable slides so that any size tread moulds or head moulds can be used by almost instant adjustment. Miller is also making a different style of vulcanizer for manufacturing new tires which it is said will require much less equipment and will save 80 per cent in the fuel bill. Chas. E. Miller, Anderson, Ind.

Gwynn-Bacon Steam Operated—The No. 1 and No. 2 Gwynn-Bacon vulcanizers are unchanged, but the No. 3 has been improved by the addition of a tube rack. This steam-operated instrument uses a steam gauge for perfect pressure control. In this gauge there is an electric connec-



CAN you imagine a 1917 twelve-cylinder, streamline speedster purring through the darkness with a pair of modified barn lanterns mounted on its front? Still, you can very nearly count on your fingers the number of years which have passed since such equipment has graced our motor cars.

E. & J. Headlights—The E. & J. line of motor car headlights comprises several types ranging in price from \$3.75 to \$5.50. The \$5.50 lamp has an overall dimension of 11 in. while the less expensive one has a 9-in. diameter. The line also includes electric sidelights and tail lights with and without license brackets, a spotlight with or without rear-view mirror having a universal bracket and provisions for a windshield attachment and two types of oil side lights. Edmunds & Jones Corp., Detroit.

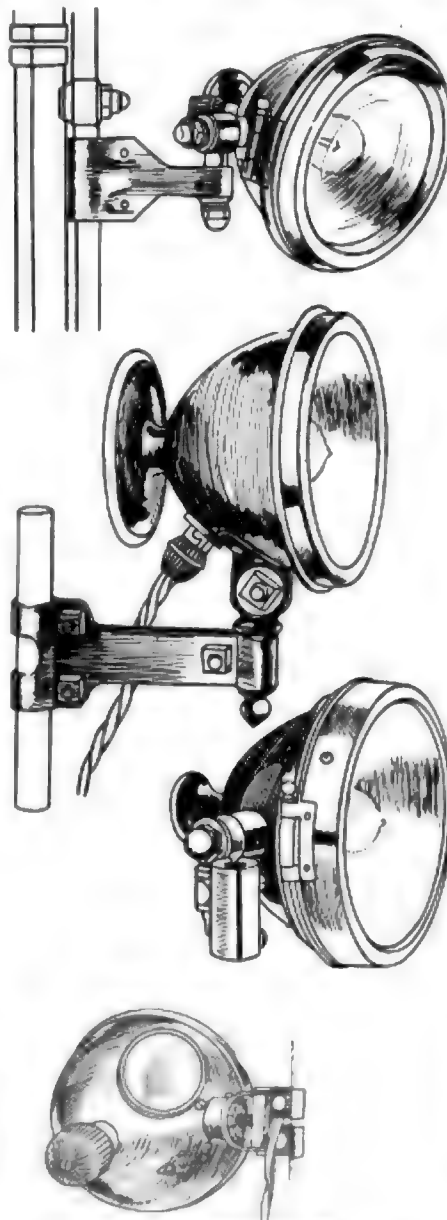
Gray & Davis—One of the newer features of G. & D. lighting equipment is a new spot light illustrated on page 100. It has a compact universal bracket and a switch. Gray & Davis, Inc., Boston, Mass.

S. & M. Products—All S. & M. lamps are being continued in the same form that they have been manufactured for several years. There will be no additions to the present line, which includes several varieties of spot lights for windshield attachment with universal brackets and 10 and 12 in. headlight for use on the front of the car. The feature of the headlights is the diffusing lens which is said to produce a non-glaring yet a powerful light. S. & M. Lamp Co., Los Angeles, Cal.

Searchlight with Windshield Bracket—The Howe searchlight is continued in its present form. The most interesting feature of this equipment is the universal bracket which gives a very solid anchor for the light although it may be moved to any desired position. Howe Mfg. Co., Chicago.

Connecticut Dash Lamps—A dash lamp for solid attachment and a combination dash and trouble lamp are among the Connecticut products. The dash lamp sells for 75 cents. The 75-cent dash lamp has the feature of a switch incorporated in it so that the necessity of an extra controlling

switch and the necessary wiring to it is obviated. The combination dash and trouble lamp is primarily a dash lamp which can be removed from the dash socket and used for trouble purposes by means of an extension cord ten feet long. By revolving the lamp it may be turned on and off. The



FOUR SPOTLIGHTS
Reading from top to bottom—Vesta, Penfield, S & M, and Culver-Stearns

complete equipment sells for \$2. Connecticut Telephone and Electric Co., Meridan, Conn.

C. S. Lighting Accessories—C. S. lighting accessories include holdfast connectors, connector plugs, special elbow plugs for Ford cars, single and double contact angle plugs, switches, lamp sockets, trouble lamps, dash lamps, search lights, etc. The searchlight, which is known as the Giant, is furnished without mirror at \$5 and with mirror at \$6. The handle contains a switch operated by twisting the end. Culver-Stearns Mfg. Co., Detroit, Mich.

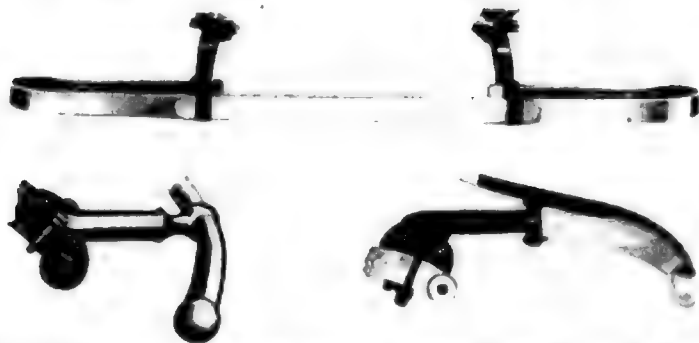
Penfield Spotlight—These types differ in that two have different kinds of knobs and the third is equipped with a rear view mirror. The lights are all heavily coated with best quality black enamel. The spotlight sells for \$7 and \$6.75, depending upon the finish when equipped with mirror. Others sell for \$6.50, \$6.75 and \$6. They are all equipped with substantial universal brackets. Penfield Mfg. Co., Inc., Meridan, Conn.

Battery Tail Light—The Malco device is an assembly of battery tail light and license bracket designed to take the place of kerosene lamps on cars so equipped. It will give 125 hours of lighting service on two ordinary dry cells. It is furnished complete with combination socket, switch and lamp finished in black with nickel trimmings, \$2.50. Malton Specialty Co., Inc., Boston, Mass.

Lights for Limousines and Hearses—Special types of lamps for use as side lights on bodies of limousines, hearses and ambulances are furnished in six different styles, all of which are very artistic in shape, and well finished. The limousine lamps in four styles sell for \$25 per pair. A special lamp for hearses is built in three types, two of which are for electric lighting only and sell for \$44 per pair and the other one a combination kerosene and electric light, selling for \$48. White Mfg. Co., Bridgeport, Conn.

Old Sol Equipments—Hawthorne products will be continued as manufactured in 1916. The most recent offering of this line is the Old Sol nitrojector spotlight. Outside of this there are 6 and 7-in. spotlights, which do not include the focusing feature found in the nitrojector. A feature in this latter type is a device in the form of shutter which is turned down over the bulb to vary the degree of intensity of the light. In addition to this there is a focusing device and lighting control for setting the position of the bulb itself, this being operated from the outside, and a concealed pilot bulb which is invisible to the eye serves as a lighting device when the car is left standing. This very complete and substantial light sells for \$10. Hawthorne Mfg. Co., Inc., Bridgeport, Conn.

The Dressel Offerings—Included in the line of Dressel lamps is an electric headlight of a conventional dome type, electric



Above—The Grossman spring-type Evergood. Lower left—One type of Buckeye bumper. Lower right—The Sager spring-type with universal bracket

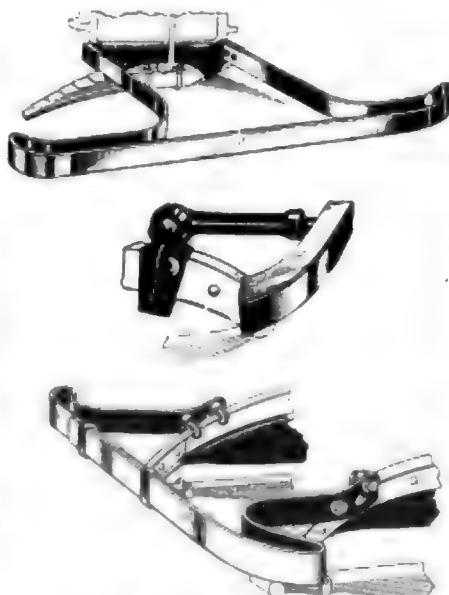
channel, round, and spring bars, and is attached by means of two stirrups, passing outwardly over the bumper connection and bolted to the body. In these, as in the others, the plunger mechanism is entirely closed. L. P. Halladay Co., Streator, Ill.

Kimball Bumper—The Kimball bumper is an extra strong spring type with very attractive lines, so built that it will not become loose and rattle. In the type with black bar and nickel or brass tees, the cost is \$15, and in all nickel or brass finish, \$18. Simplicity is evident inasmuch as the only working parts which could possibly need replacement are the bumper socket, plunger, crossed T, cap nut, and spring. C. P. Kimball & Co., Chicago.

Gemco End-Thrust Types—The Gemco Model K end-thrust bumper is made with diamond leaf spring and U-shaped bars. They sell at prices ranging from \$6 to \$9.50. They are of the type which take the recoil on a coil spring which is inclosed in a dust-tight plunger. These are built as the Gemco Special bumper with a universal bracket which is applicable to practically all makes of cars. The Gemco Special also is provided with this toothed hinge. Gemco Mfg. Co., Milwaukee, Wis.

Safety Bumper—Safety bumpers are being continued at the same price as heretofore, namely, \$4.95 for black enamel and \$5.95 for nickel finish. This is of the solid cross bar type, the bars being made of the best cold rolled steel. The arms are malleable iron castings, and the bumper complete weighs approximately 17 lb. It is made in three styles, the Model R being for cars with dropped front spring hangers, the Model F for Ford use, and the Model SC for Saxon four or six, or the Chevrolet 490. Safety Mfg. Co., Toledo, Ohio.

Sager Bumpers—Sager bumpers are made for front or rear application in a variety of types. The rear bumper can be attached to three-quarter elliptic springs and has a universal adjustment. With compensating springs to prevent breakage of car springs under severe impact. There are two types of spring steel bumpers for universal application. The Sager protection bumper is a type having a long extension arm with a long spring suspension to prevent damage to the car. Internal coil spring plunger types are made with universal brackets and



American all-spring bumper, a Gemco with adjustable brackets and a spring job from the Metal Stamping Co.

with diamond, half-diamond, and U-shape bars. There are special fittings for Cadillac, Reo, Pierce-Arrow, Packard, Cunningham, Franklin, and Saxon Six. J. H. Sager Co., Rochester, N. Y.

Bull Dog Spring Bumper—The Bull-Dog spring bumper is composed of an L-cross bar supported to the frame by means of a U-spring. This spring is designed to effectively eliminate shock when an obstruction is encountered. There is a universal bracket which permits application to practically

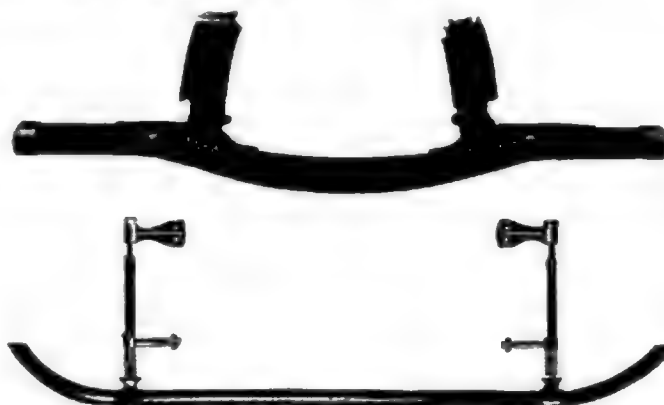
all makes of cars. The bumper for large cars sells for \$5.50, and the special Ford size for \$4.50. The Toledo Cable Co., Toledo, Ohio.

Rubber Cushion Fender—The Howe rubber cushion fender is made of best spring steel into which is fastened a heavy rubber cushion. The spring steel cross bar is in the form of a shallow U and the rubber is fitted into the front of this, giving a combination springing from the rubber and the steel. It is supported to the frame extension of the car on a universal bracket, and made in two sizes, selling for \$12 and \$15. The Auto Cushion Fender Co., Columbus, Ohio.

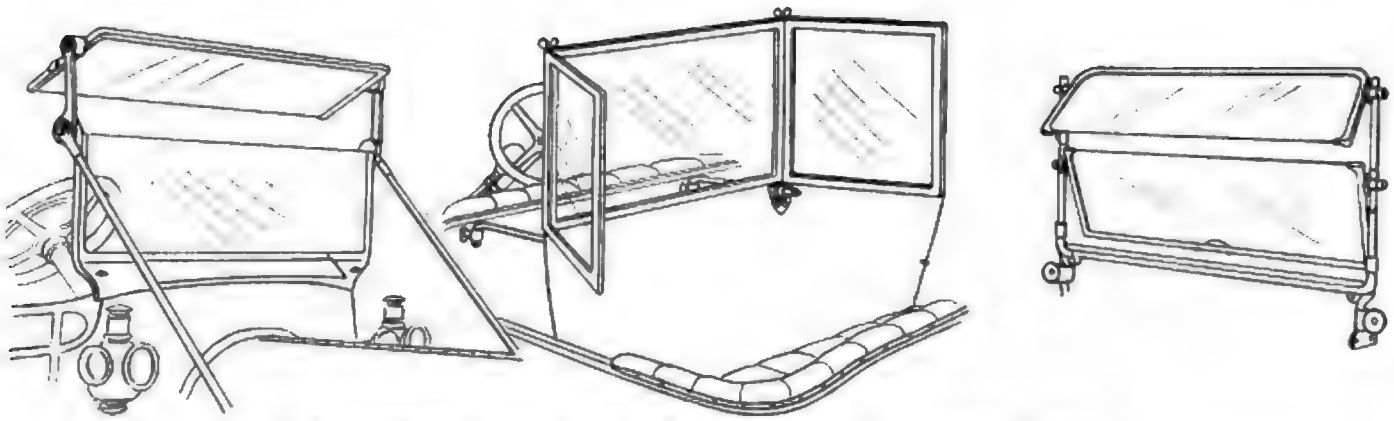
Buckeye Bumper—Rails for Buckeye bumpers are made in channel, diamond-channel, single spring, triple spring, double-spring and round styles. The diamond-rail is very rigid and at the same time very light inasmuch as it is hollow and fitted with a wood insert throughout its entire length. Particular attention is called to the triple-spring type which has main and front leaves with 2-in. face made of 80-point carbon steel. Central Brass & Fixture Co., Springfield, Ohio.

Badger—The new Badger side frame bumper is equipped with brackets that can be attached to the car frame without making mechanical changes of any kind or drilling holes. The thrust of collision impact is taken up on four different points, each one reinforcing the other. The line is completed with leaf spring bumpers of various types, a Simplex bumper for certain makes of cars, a Presto bumper with solid clamping bracket, and other types, including those for rear fitting. Auto Parts Mfg. Co., Milwaukee, Wis.

Ever Good Bumpers—The Ever Good line is composed of a variety of types with all kinds of fittings for every car. One of the leaders is the double spring bumper constructed with two bars made from high-carboned steel springs. They will stand great depression and return to their normal shape. Special types are made for Franklin, Ford, Packard, Dodge and Chevrolet 490 cars. The bumpers range in price from \$6.50 to \$14. Emil Grossman Mfg. Corp., Brooklyn, N. Y.



Rubber cushion fender and a Turner Brass Works offering



Troy triple-action, J H tonneau shield and one of the Motor Products jobbers' shields

for the more common models of cars. A recent test under A. A. A. observation has shown remarkable increase in economy from its use. This is made by the Gillette Motor Co., Mishawaka, Ind., and marketed by the Whittier Sales Co., Chicago.

Misto-Kleen—A spray polishing outfit is the Misto-Kleen by which dust and dirt is removed and polish put on the body by a special liquid and spray pump. A companion polisher is the Misto-Cloth, with which the polishing operation is done. Crew-Levick Co., Philadelphia, Pa.

Prime-Ur—A priming device designed to give easy starting by the injection of an exceedingly rich mixture is the Imperial Prime-Ur. This consists of a small pump in connection with the gasoline line and manifold such that fuel is drawn from the former and injected to the latter by an up-and-down stroke of a small dash pump. The installation is simple. Imperial Brass Mfg. Co., Chicago.

Van Cleef Specialties—Rubber cements for tire repairs, puncture and cut fillers, engine enamel, valve grinding compounds and radiator seals are among the Dutch Brand Products, one of the features being the 2 in 1 tread filler which is put up in tube form for easy application to cuts in treads. Van Cleef Bros., Chicago.

Auto-Kleen—A body polishing preparation called Auto-Kleen is designed to be used in conjunction with Simons polish paste. The paste is applied, leaving a film on the surface which is brought to a brilliant finish with Auto-Kleen. Price is 50c per can. Simons Mfg. Co., Chicago.

Higgins Springs—Springs for replacement purposes are carried under the name of Higgins. These are featured by the absence of the center bolt and by inter-leaf lubrication. Higgins Spring & Axle Co., Racine, Wis.

Tire-Doh—Tire Doh products comprise a complete line of tire repair supplies, polishes, top and leather dressings, and so on. Tire-Doh itself is designed for filling punctures and cuts in casings, and has been on the market for 6 yrs. Atlas Auto Supply Co., Chicago.

Gravity Feed Systems

THERE has been an unusual activity recently in fuel feed systems. The new ones involve, like the Stewart, a supplementary fuel tank which may be mounted on the back of the dash or other convenient part and from which gasoline is fed directly by gravity to the carburetor and in which a float level is maintained. This permits the fuel to be carried at a lower level than the carburetor.

Stewart Vacuum Tank—The Stewart vacuum gasoline system comprises a small round tank, divided into two chambers, an upper and a lower. The upper chamber is connected to the intake manifold while another pipe connects it with the main gasoline supply tank. The lower chamber is connected with the carburetor. The intake strokes of the motor create a vacuum in the upper chamber of the tank and this vacuum draws gasoline from the supply tank. Through a float valve principle the gasoline is allowed to flow into the lower chamber keeping it filled to a certain level at all times. Price is \$10. Stewart-Warner Speedometer Corp., Chicago.

Church System—Transfer of fuel from the main tank to the auxiliary tank is maintained by an automatically regulated pressure produced by the compression and explosion pressure in one cylinder. This is obtained through a check valve usually mounted in place of the petcock in the rear cylinder. Pressure thus obtained is transmitted to the main fuel tank and gasoline is forced to the auxiliary tank in the same way that fuel is forced directly to the carburetor in the conventional pressure system. The system is arranged so the ordinary maximum pressure is not 1½ pounds per square in., and is independent of the degree of vacuum in the manifold. Automatic Carburetor Co., Chicago.

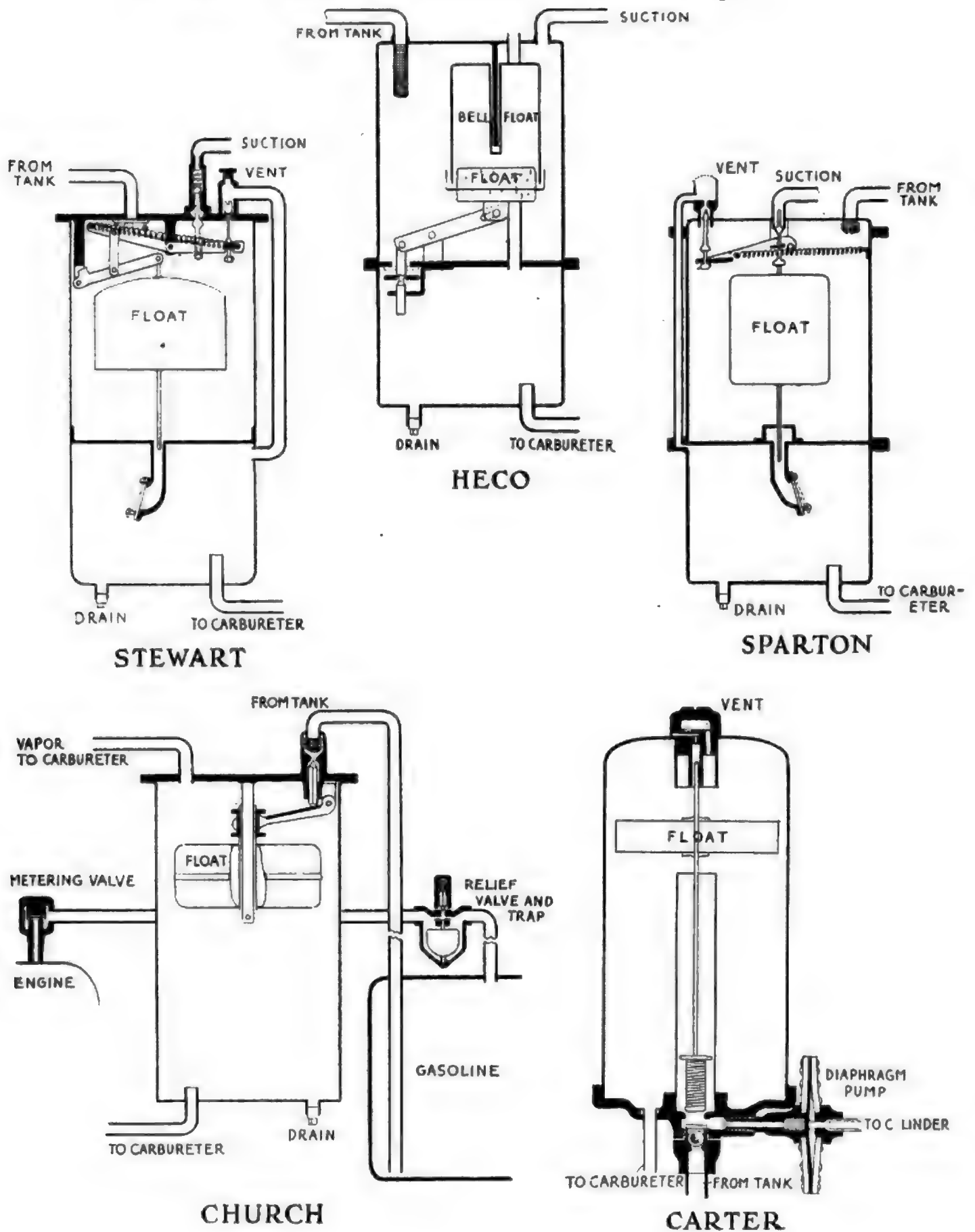
Carter Automatic Gravity Tank—Supply of a constant uniform flow of fuel into the carburetor from the rear tank is accomplished in the Carter system by automatically pumping the gasoline from the main tank to a supplementary tank, whence it

is fed by gravity to the carburetor. The Carter tank contains but three main parts and there are no adjustments required. It comprises a chamber with a capacity of about 1 pint and connected to it is a simple diaphragm pump operated by engine suction which lifts the fuel from the main tank. The level in the Carter tank is maintained by a float. Price \$10. Carter Carburetor Co., St. Louis, Mo.

Heco Vacuum Fuel System—One of the latest of the fuel feed systems is the Heco, which is operated by suction from the intake manifold. The operating portion is embodied in a small tank placed under the hood. The tank has an upper and lower chamber, the upper being the operating chamber and containing the control mechanism, which consists of a float surrounded by an inverted cup. There is but one valve and that is mechanically operated, inclosed in the connection between the upper and lower chamber. When the float is down the valve is closed. The inverted cup controls the positive action of the float by passing and retaining suction by the action of the liquid which periodically seals its lower and open end. The lower chamber is connected to the atmosphere by a vent tube which controls the gasoline level and maintains atmospheric pressure in its chamber. This will be described more in detail in a later issue. Heinze Electric Co., Lowell, Mass.

Spartan Vacuum System—When the Spartan vacuum tank and carburetor are entirely empty, 20 seconds running with the starter will fill them. With the throttle open it turns the gasoline over to the carburetor as soon as it gets it, and does not wait for a full tank. With a closed throttle it does not empty until it gets a full upper tank. This entirely new system is furnished with compression couplings, and there is no soldering or flanging of pipes necessary to install it. The price complete is \$10. Sparks-Withington Co., Jackson, Mich.

Fuel-Feed Tanks Internally



Going to School to the Traffic Cop

Kansas City Judge Imposes Fine on Law Violators but Remits It if Offender Will Exhibit Skill Before Officer

JUDGE J. H. BRADY, of the police court of Kansas City, Kan., is in accord with the campaign of MOTOR AGE to harmonize the traffic rules of cities, and to secure proper rules.

Judge Brady knows whereof he speaks when he suggests that the next step is to secure a means of enforcing the ordinances. He has found a way in his city. And it is not by fines for violations—it is by education.

"Owners don't care for a small fine, the usual \$2 or \$5 assessed for violation of traffic rules," said Judge Brady. "Chauffeurs, too, pay their fines quickly enough, rather than allow their employers to discover that they have been ignorant of traffic rules, or have been careless. Money penalties therefore are inefficient deterrents to violation of the rules. Anyway, most of the offenses are due to ignorance. While ignorance of the law excuses nobody, the offenses resulting from it should arouse the authorities to the necessity for educating the public, so that violations might be reduced. The chief end of traffic rules is the safety and the convenience of the general public, and for this reason an important duty rests on officials to see that motor owners and drivers know the rules."

Educative System

Judge Brady's system of handling offenders against traffic regulations is purely educative. He has established a school for drivers. It is on the main street, and its sessions are open to the public. The public is invited to attend the sessions, and see how cars should be driven. He established this system several months ago—but in the past few weeks there have been lamentable shortages of pupils—apparently the drivers are learning how to drive.

Judge Brady fines offenders against traffic rules. Then he makes an agreement with the prisoners. If they will promise to go to the corner where the offense was committed, and there receive instructions from the traffic policeman until the policeman declares they are competent to drive on the public streets of Kansas City, the fine will be remitted. And that fine isn't the customary \$2 penalty, either; it is \$25, or more—something worth saving.

In practically every instance, of course, the offender chooses to take the lesson. The traffic cop makes him drive his car around the corner, on the curb side of the safety posts, up and down the street, and put himself in all the situations where a possible violation of the traffic rules might occur. If the driver makes a mistake, he must go through that particular course repeatedly, until he is sure to remember.

Announcements of the names of persons arrested for violations are made in the newspapers; the dates for the training

ARIZONA PLANS NEW LAWS

Phoenix, Ariz., Jan. 21 — Revision of Arizona's motor vehicle law as regards the carrying of lights is the aim of a bill introduced in the state legislature by President Claridge of the senate. The bill provides that all motor vehicles shall display two white lights in front from half an hour after sunset until half an hour before sunrise, and in foggy weather. Lights are to be permanently dimmed, and the light must strike the ground not less than 75 ft. from the front of the machine. Headlights are to be visible 500 ft. and red rear lights for 50 ft. under normal atmospheric conditions.

All vehicles other than motor cars, motorcycles and bicycles are to be required to carry a light on the left side, visible from the front, rear and left for not less than 200 ft.

A law requiring wider tires on metal-tired vehicles, and graduating the license tax on trucks according to weight also may be introduced at this session of the legislature.

CONTEST CHAUFFEUR LICENSE LAW

Downers Grove, Ill., Jan. 22—The constitutionality of the Illinois law which provides for the licensing of chauffeurs, is involved in an appeal case from the finding of the circuit court of Du Page county and which has been filed in the supreme court. George B. Heatt et al. lost a suit in the lower court in which they attacked the validity of an ordinance taxing the owners of all motor trucks, mail wagons and other vehicles driven for hire.

TO LICENSE ALL DRIVERS

Albany, N. Y., Jan. 20—The drivers of motor cars, whether owners or chauffeurs, may be compelled to obtain a license from the secretary of state if the safety first bill introduced by the New York legislature this week becomes a law. Among the provisions of the proposed law is one for suspension and possible revocation of a license on the third conviction for speeding in any one calendar year. The bill also provides drastic punishment affecting persons driving while intoxicated and those who attempt to escape after having run down a pedestrian.

course are set far enough ahead so that the prisoner's friends will be sure to arrange to watch. And these friends come in crowds. Frequently there have been forty or fifty prominent citizens on the corners, watching the training of a business or social associate. Nobody is exempt from this procedure, and some of the most distinguished citizens, who have thoughtlessly driven down the car tracks instead of outside the safety zones, have taken the course. It is obvious that the education is quite as much for the benefit of the onlookers, as for the subject.

Some chauffeurs have been caught in this school, but they very soon conceived the notion that it was seriously damaging to their reputations as chauffeurs to be compelled to go to school to a traffic cop. These chauffeurs had previously been quite willing to pay fines, even to \$10, rather than allow their employers to discover that they had been careless; their standing depends on their carefulness, for no man would trust his family with a chauffeur who is publicly known to be reckless, or disregarding of the rights of others—of the safety rules. Incidentally, no owner is going to trust his car to a chauffeur who is likely to disobey traffic rules and thus lay the owner so obviously liable for damages if any accident occurs. The mere announcement of the publicity that would be given for disregard of regulations was enough to start every chauffeur in Kansas City, Kan., to studying the rules.

Consequent Advantages

In addition to the obvious benefits of the Brady plan, as outlined, there is another advantage. Every driver of a car, whether an owner or a chauffeur, has his own circle of associates. Naturally he is going to be joked about his arrest and his going to school, in the club, or the church, or the saloon, or the pool hall, or wherever he spends his time. Naturally, every other person in that circle is determined that he shall not be made a victim of like mirth. One arrest, therefore, has a widespread influence towards familiarity with traffic rules, and whether all the friends of the culprit have cars or not, they all take occasion to find out something about the local regulations.

The fact that there has been no session of the school since the first of the year, and not a dozen for a month, indicates that the plan works. There were a dozen or more a week for a while. The traffic policemen at the corners of the congested district enjoyed the school—they are as diligent as ever in watching for violations, but violations do not occur.

The show puts the selling of a car on a more keenly competitive basis. The motor car itself has become more or less standardized, especially the older makes. More attention is given to the body and finish of the body than before, and the prospective customer is more than apt to be sounded as to her preferences in that line. Also the prospective buyer, naturally a consistent attendant at the show, wants to be told these things and to be told why this or that body is the best for the car she finally will make her own.

Maker's Name Reliable

Given a maker with a reputation in which confidence can be put little cause for buying a poorly made car remains. The chances you take in buying a car are much less now than they were a few years ago, when each year had brought continued experimentation, and necessary experimentation. If the manufacturers of the car are thoroughly reliable, the car is most likely from an efficient shop and made from the right pattern and the best materials obtainable.

If the price limits the range of your choice, the show will tell you what remains within your means. Though, as for that matter, it is not the first cost but the upkeep that should govern your final selection. An experienced transcontinental motorist says that four persons can cross the continent with an average expenditure of \$40 in all, this excluding tires and repairs for the car. These depend more or less on the fortunes of the road and the driver's mechanical skill. His estimate has been doubted. It was doubted by many, he reports, even when he added \$20 to it. It may be that you could not keep up your car at this rate.

Besides, the price of gasoline has not stopped rising, and nobody seems to know when it will stop rising. What might be called a low-priced car may amount to more than you can afford when the upkeep is considered. What might be called a high-priced car may amount to a mere bauble if you can afford to have those kind of baubles. The point is: You will not obtain the full measure of pleasure from driving a car if you must get gray-headed over the expense of upkeep and repairs.

Show Week Is High Noon

But the Coliseum days will help you out if you are a prospective buyer. At the high noon, which is show week, the air is full of opportunities and they fairly seek you out. Lots of fun being one of many when the motor car is the point. One purpose, one intent, to all appearances—it makes you wonder that the world has so many persons interested in the self same thing.

But this interest, now it's mentioned, gets worse every day. One joins the ranks before you know it, and the car owner's company is clear out of bounds. Perhaps it is a good thing the law-makers do not bother with heeding the company, or there

is no telling but a charge of watered stock would come its way. No monopoly, of course. Take the Columbia University student who followed the Lincoln highway as an applicant for vacant motor car seats. He didn't own a car, but he rode in several and got the very pleasure that the car is famed to bring.

Next week the Coliseum will reflect all this atmosphere of open air and free highways that are getting better all the time just so you and your neighbors can use your motor cars. If you can, plan to be there. Many of you will and always will, for the motor industry has attracted its fans as the diamond did before it. And the bleachers are the Coliseum at the times of the motor car shows.

Feminine Motor Notes

The motor car has long been a factor, and an important one, in producing a moving picture, but in the new serial, "Patricia," on preparedness it has an even more important one. In one picture given out in advance of the showing Mrs. Vernon Castle, the bright, particular star of this film, is at the wheel of a car, ready in more ways than one for a dash across the screen. She wears a cap similar to an aviator's with sweater coat and scarf. She is advertised as America's best dressed woman, you know.

It might be interesting to notice how many makers advertise new features with a woman displaying the advantages of those features. She does everything from operate a long handled jack to sit on a shock absorber.

Now is the time to get that rough-wear motoring coat. February is the month of low prices for winter coats, and the winter coats are just what you want most often any time of the year. They may be obtained in good cloth and style for less than \$15, while \$25 will buy you the coat that formerly sold for much more. The advance spring styles are approaching gradually, but the fresh storms are anything but springlike.

The two-toned sports suit has been on display in Chicago recently, and it may be well to mention it in view of coming sports suits. It is made with Russian blouse effect. The skirt has a front and back panel, and the blouse is also in panels. Stripes, of course, give the two tones.

Drivers of Oakland cars may have a fine chance to help their country in time of need. The Chicago dealer has conceived the idea of their forming an army reserve for future military service, if they are willing. Letters have been sent to all women in Chicago who drive this particular make, and many have answered already, according to the agency. The Chi-

cago dealer will arrange for military instruction in handling the cars.

Strictly tailored sport suits of velveteen, corduroy and medium weight wool materials seem to be as popular with the tourist as with the woman who uses them for town motoring. Big coats are worn over them while in the car. In this way, women say, they feel more dressed for stopping at hotels. Vests of leather add protection. The skirts of these suits usually are cut plainly, depending on pockets of various sizes and shapes for trimming.

Marshall Field & Co. have some Scotch wool hose this winter that might prove a boon to the woman motorist. Those of particular interest in this respect are of soft wool in full length stocking-leggings to draw on over shoes and hose. An opening in the heel and leather reinforcement to serve as a sole make them serviceable as well as warm. Price, \$2.50.

From Houston to St. Louis

EVEN if it is the winter season there are some parts of the country which do not know it when it comes to touring and Texas contains a large share of those parts. Texas, the state of the six flags—she admits it, herself—furnishes a field all within the state's limits for quite a tour. One can take a week to go across her width and never know that the car one drives has not been traveling all the time.

But Texas also launches touring parties into the neighboring and then farther states. Mrs. D. J. O'Keefe motored from Houston, Texas, to St. Louis recently, making a trip of 1265 miles all told. The weather was bad and the roads were sympathetic all along the way, but she made the trip with exceptionally clear records in spite of bad conditions.

From Houston the route lay over the Texas-Oklahoma highway to Wichita, Kan. At that town the Santa Fe trail was adopted, and the route lay over it through Kansas City to St. Louis.

Mrs. O'Keefe kept a diary of the trip. From Oklahoma on the entries read of rain, snow, sleet, mud, sand and frozen ruts and were repeated many times. The remarkable part about it is that in spite of the road and weather conditions the tires gave the only trouble.

An Enthusiastic Motorist

This was the second car of the same make Mrs. O'Keefe had driven. She uses a Kissel-Kar and is an enthusiastic motorist, having had much experience in driving her own car before starting on this trip. That she is a good motorist is shown by the absence of any except minor jobs for the service men at the station of the St. Louis distributor. The car merely wanted to be cleaned and polished. A record of the gasoline used gave about 15 miles to the gallon.

The Readers' Clearing House

IN FIGURING SPEEDOMETER GEARS

Special Specifications Apply to Different Makes—Stewart Cited

CLAUDE N. Y.—Editor *MOTOR AGE*—Give information on how to figure the gear ratio for speedometer drive on cars of different size wheels.

2—Is the driveshaft speed of all speedometers the same? That is, would the correct gears for one speedometer be right for any other make?—J. H. Imhoff.

1—Taking a particular instance, in the installation of a Stewart speedometer the road wheel gear must have twice the number of teeth as there are inches in the diameter of the tire. The fiber pinion should have sixteen teeth, inasmuch as this is a standard adopted on these speedometers. For example, on a 34-in. tire you would multiply this amount by two, the resultant being the number of teeth there would be in the road gear wheel. Of course you must be sure that the two gears are of the same pitch, which can be determined by seeing that the pitch number on the gears is the same, such as 9 pitch indicated by 9-P.

Of course this formula would not apply where the speedometer is driven from the gearset. In that case no specific rule can be given for figuring gear ratios, as there is really a different rule covering each individual case. To list even a few of these formulas would take up several pages of this magazine, and even then the average car owner would be unable to figure the proper gears to be used in connection with this car.

2—No.

MOTOR USED IN THE SAXON SIX No Appreciable Dead Weight in Non-Firing Six Cylinders

Cheyenne, Wyo.—Editor *MOTOR AGE*—Does the Saxon Six use the model 7-W Continental motor?

2—What are the advantages and disadvantages of vacuum fuel feed as compared with other systems?

3—In the Eger twin-unit twelve I should think that the six cylinders that are working when the others are not out would lose power in moving the dead weight of the six idle pistons. Can *MOTOR AGE* give me a better idea of this? Does the National Twelve also have a twin-unit feature?

4—How was the r.p.m. obtained in the Chalmers?

5—Where is the Duesenberg motor made, and does the company build stock models?

6—What cars selling over \$2,000 have valve-in-head engines, excluding twelves?

7—Why is the Van Stelden speedometer called air-driven if it works on the transmission?—W. A. P.

1—The type of motor used in the Continental six-cylinder models is known as the Continental V 2. It is built in accordance with Saxon specifications and is not used by any other builder of motor cars.

2—Vacuum feed eliminates the need of airtight pipes and an airtight gasoline tank in which the cap must be sealed with a gasket, when the gasoline tank is applied

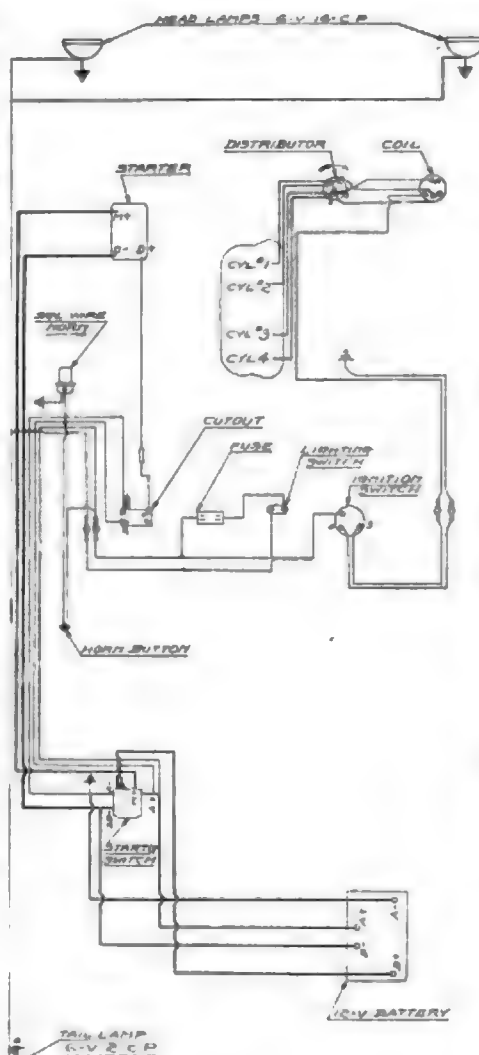


Fig. 1—Diagram of the Apico system on the Dord

to the rear. It also permits the gasoline tank to be carried in the rear instead of the cowl without use of the pressure system. This gasoline tank is favored by the majority, although there are several adherents to the cowl tank location. The disadvantages fall under what all mechanical devices come under. If they get out of order they refuse to operate. However, they seldom get out of order.

3—The six cylinders are operating free not against compression. Thus all the working cylinders have to overcome is the friction loss in the operation of the cylinders, which is very small. It is theoretically true that power is lost in moving this weight, although the lack of compression and lightness of the reciprocating

parts makes this almost negligible. The National has no such feature.

4—By counterbalancing of the crankshaft and fine balancing of parts together with incidental refinements throughout the motor.

5—Duesenberg Motor Co., Chicago. Motors of stock design are built on special order.

6—Pathfinder, Dorriss, Haynes twelve enclosed cars.

7—An air pump is driven from the gearset. The speedometer operates from the current of air generated by this pump. The air is driven against a blade on the speedometer dial. This dial is held under tension by a hair spring. The faster the car goes the more air driven against this blade and thus the farther the dial moves.

Dord Wiring System

San Antonio, Tex.—Editor *MOTOR AGE*—Publish diagram of the Apico system as used on the Dord car.—E. J. Hanlman.

The diagram you ask for is shown in Fig. 1.

Nitrogen Bulb Life

Fort Dodge, Ia.—Editor *MOTOR AGE*—In reading an article by Wallace Blood he says tungsten light bulbs decrease in efficiency at a rate that makes renewal profitable in 2 or 3 months. Please advise if the same is true of the nitrogen filled. I have been thinking of equipping my car with them.—A. E. Burgfried.

Although there seems to be no accurate figures on this, it is true that nitrogen-filled bulbs are longer lived than the other kind. However, four months is the maximum that a nitrogen can be expected to give profitable burning.

Alcohol in Gasoline

Huntington, W. Va.—Editor *MOTOR AGE*—Can wood or denatured alcohol be mixed with gasoline and used in a motor. If so, how should it be mixed. Is it harmful to the motor?—C. M. Buck.

Yes, it can be mixed with the gasoline without doing any harm, but what do you want it there for?

Kerosene Injures Rubber

Worthington, Minn.—Editor *MOTOR AGE*—Advise as to the value of using kerosene in a radiator in cold weather. It has been recommended to me by garagemen who claim there is no danger from its use and the possibility of a frozen radiator is entirely eliminated. If safe and practicable, is it slower in starting the motor, either by electric or hand starter, and why is it not recommended by motor publications?—H. E. Lamb.

Kerosene, if used continually throughout the winter, is going to eat out a couple of sets of rubber hose connections between the radiator and motor. Alcohol or glycerine will not do this. If you are willing to replace the hose go ahead and use the kerosene.

In Large Valves—Increase Power

Tenague, Tex.—Editor *MOTOR AGE*—I have a Model B-24 Buick and while I do not desire to make a racer out of it I do desire to get all the power possible, as I expect to drive to California soon. Would it increase the power to

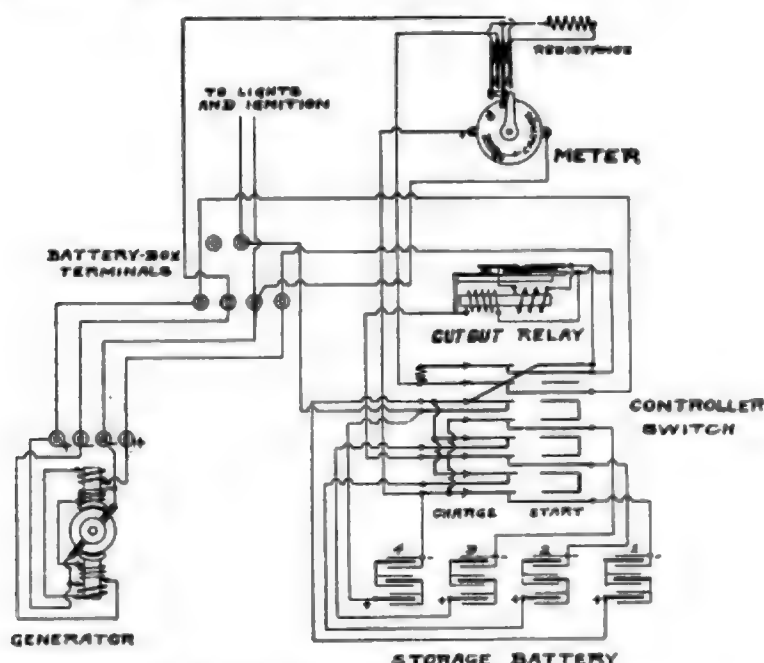


Fig. 2—Diagram of charging circuit of 1913 Cole

it would necessitate also showing the discharge of the cranking circuit. In case you do desire to obtain this, however, an ammeter connected in the line from No. 3 as marked on the diagram of the charging circuit, on the controller switch before it has reached any junction will show this net rate. It would be advisable to use a meter that would show a discharge of 50 amperes or over in order to allow for the flow of current when cranking the engine. The above connection will give you the net charging rate, and if you desire to show merely the gross rate, a meter connected in the line running to the outer terminal of the circuit relay will indicate this very nicely.

2—Yes, but it is a job for an electrical expert.

3—MOTOR AGE has no files on motorcycle specifications.

THE OIL FLOW PATH IN OVERLAND Information on Oakland Eight — About Using One Light

Bouton, Ia.—Editor MOTOR AGE—Show by diagram the path the oil flows in model 80 Overland.

2—What wages do purchasing agents and sales managers get per month?

3—Give weight of the new 1917 Overlands?

4—What advantages has the unit power plant over the other kinds of gearset location?

5—What is the valve lift in the eight-cylinder Oakland?

6—The push rods in my model 80 Overland can be moved from side to side about $\frac{1}{4}$ of an inch. How can this be remedied?

7—Does it make any difference if I remove one of the lamp bulbs when my battery gets low so it won't take so much current?

8—Is the Roosevelt sleeve valve motor used in any cars?—A Reader.

1—This is shown in Fig. 3.

2—Anywhere from \$150 to \$2,000.

3—Country club, 2000; 85-4, 2825; 85-6,

2990. These are fully equipped with tanks empty.

4—MOTOR AGE can express no preference in matters upon which there is such diversified opinion.

5—The valve lift in the Oakland eight is .3125 in. This is the distance the camshaft raises the lifter.

6—By replacing the push-rod guides.

7—You are liable to burn the other light out.

8—No.

Studebaker Motor Trouble

Yale, Okla.—Editor MOTOR AGE—I recently overhauled a Studebaker car and put on all new oversize rings, a new late model Atwater Kent and a new Miller carburetor, started the

Communications Received and Inquiries Answered

J. H. Imhoff.....Chazy, N. Y.
W. A. P.....Cheyenne, Wyo.
R. J. Haniman.....San Antonio, Tex.
A. E. Burgfried.....Fort Dodge, Ia.
C. M. Buck.....Huntington, W. Va.
H. E. Lamb.....Worthington, Minn.
C. P. Logan.....Chester, Mont.
H. S. Mathews.....Detroit, Mich.
O. C. Meyers.....Big Sandy, Mont.
A. D. Jenkins.....Chicago
Floyd H. Fulmer.....Mishawauka, Ind.
M. P. Shook.....Yale, Okla.
Floyd Waters.....Nutterville, Wis.
A. Reader.....Bouton, Ia.
No communication not signed by the inquirer's full name and address will be answered in this department.

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Studebaker Motor Trouble

Yale, Okla.—Editor MOTOR AGE—I recently overhauled a Studebaker car and put on all new oversize rings, a new late model Atwater Kent and a new Miller carburetor, started the

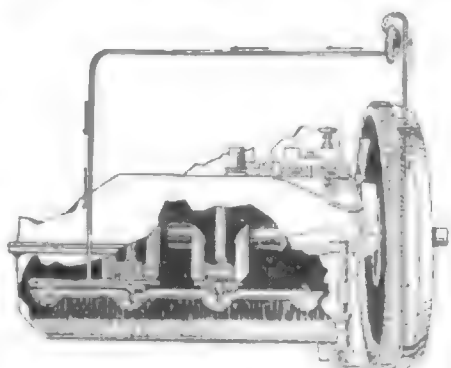


Fig. 3—Path of oil flow in Overland model 80

motor and when I got it adjusted and speeded it up to about twice the speed it used to have, it jerked the nuts from the connecting rods, sheared them off smooth as though there never were any threads in them. Could the carburetor have been the cause? I did a good job on this and I had plenty of oil in the crankcase. Advise if I can use this special carburetor and ignition mentioned if I use heavier bolts to fasten these connecting rods to the crankshaft.—M. P. Shook.

The cause might have been that the higher speed was too much for the internal parts. It is our supposition, however, that in overhauling the car you disarranged the alignment of the crankshaft, the connecting rods or both, and this faulty alignment caused a strain on the bolts which caused them to let loose. You had better look for this before using heavier bolts.

SIZE OF HUPP 20 PISTON RING Put Non-Leaking Rings on Top of Piston, Advice

Mishawauka, Ind.—Editor MOTOR AGE—What size piston ring does the Hupp 20 use?

2—What kind of paint will stick to a galvanized iron body?

3—I have a Remy model L magneto on an Overland model 69 which will not fire unless the spark is fully advanced or retarded. What would cause this? The breaker points are clean.

4—I intend to put two non-leaking rings on each piston of my Hupp 20. Would it be best to put the plain ring on top or bottom?—Floyd H. Fulmer.

1—The Hupmobile 20 uses a $3\frac{1}{4}$ by $\frac{1}{4}$ in. piston ring, providing it has not been rebored.

2—A good body enamel.

3—Looseness in the connection of the timer. It probably holds tight with the lever in the middle and gets sloppy when the lever is placed at either end.

4—Put the plain rings on the bottom. You want to hold your compression as high up as possible.

NO CLUTCH BRAKE ON BUICK C-37 Suggested Way of Shifting from Low to Second Without Clashing

Nutterville, Wis.—Editor MOTOR AGE—Is there a clutch brake on the model C-37 Buick? If so, where is it located? I have trouble shifting from low to second, as the clutch spins so that the gear-changing lever has to be manipulated very slowly to avoid clashing of the gears.

2—Should there be any up and down play in the oil pump driveshaft, and would this play cause a knock audible every revolution of the camshaft?

3—What is the maximum speed of the Saxon Six motor and also of the car? Also maximum speeds of the Franklin, Moline-Knight, Oldsmobile Eight and Stearns Eight?

4—Can the Buick C-37 engine be started on the spark if in good condition? I have tried it several times without success. The motor it several times without success. The engine Waters.

1—There is no clutch brake on the model C-37 Buick. A suggestion to help shifting from low to second is that you do not release the clutch to the full release, but just far enough to make the change and not allow the clutch to spin.

2—The oil-pump drive shaft should be rigid and if it is loose it can cause a knock.

3—There have been no official records of the maximum motor or car speeds of any of these makes.

4—It is always luck when a motor will start on the spark. With the present grade of gasoline it is practically an impossibility.



The Motor Car Repair Shop



The Right Way With Tire Chains

Being a Plea for Personal Thrift in
Saving Money for Yourself
and Others

NO motorist needs to be told that he should use tire chains as accident insurance when driving over snow covered, icy roads and city streets in winter, or for that matter, with driving over a pavement that is extremely slippery, whatever the time of year. Yet my observation convinces me that a large proportion of drivers could profit by a hint or two as to how they should use the chains to get the most out of them.

I have been more than moderately surprised recently at the large number of chain-equipped cars that are being driven over absolutely dry pavements. The city in which I live was visited some time ago by a 6-in. snow storm, accompanied by rain, so that when it finally cleared off cold, as is usually the case with such storms, the city streets were naturally in a very dangerous condition for motor car traffic, and most cars came out with chains. But these conditions lasted only a relatively short time. A few warm, sunny days speedily melted off the ice and snow, leaving the pavements virtually bare and no more productive of skids than in a period of dry mid-summer weather.

Chains On Dry Roads

Did all drivers of motor cars remove their chains as soon as the need for them had passed? They did not, and not by a large majority. I took pains to note the cars still carrying chains, and the proportion was by no means small. I was calling just at dusk at the home of a friend, some days after the snow had disappeared, and the daughter of the family asked me to accompany her to the garage, as she wished to take out their car. As we drove out of the garage, I spoke of this matter of tire chains, vigorously condemning the careless practice of leaving them on between storms, but stopped suddenly when my companion at the wheel remarked sweetly,

"The chains are still on our car." I had overlooked this important fact because of the darkness. Then she added, "It's such a bother to take them off!"

Such a bother! Is it? It isn't even necessary to jack a wheel up in order to remove a tire chain; about as much bother as screwing down the grease cups at the proper time. The young lady's statement, however, reflects an attitude that is becoming altogether too characteristic of America and its people. We are too ready

to tolerate wastefulness and some certain expense, if thereby we can manage to save ourselves a trifling bit of bother.

Tire chains, like tires, are a big source of expense if they are not properly cared for. One result of inattention is the replacement of the chains. This is especially true if the chains are not adjusted properly, very frequently the case, as when a car passes you with its skid chains jingling a merry tune on the asphalt. The chain that fits loosely does not fit properly, though, of course, it must not be so tight that it cannot creep, for the latter condition means quick ruin for the tire, eventually resulting in the cross chains sinking into the tread and causing the rubber and the fabric to pull apart.

But time after time I have seen chains so loosely fitted that the centrifugal force of the turning wheel threw the cross chains two or three inches out from the tread. Imagine with what a tremendous blow each cross chain must then hit the pavement, especially if the car is traveling at a good speed. And on an asphalt or concrete surface consider what a destructive effect that never-ending succession of blows will have on the chains. One can readily imagine that under such harsh, unfavorable treatment the life of tire chains could easily be reduced to a mere fraction of what should be their period of usefulness. Such misuse of the chains must also appreciably increase the wear on pavements.

Tire chains may be held in the right position by the use of the spring adjusters, the cost of which is very moderate; they can be bought in most places as low as \$1 per pair. They hold the cross chains snugly against the tread of the tire, removing all possibility of slapping against the pavement, with the resulting destructive, file-like grinding action which quickly wears the steel links. And at the same time the chain is not held so tightly that it cannot creep around the tire under the drive thrust from the motor.

Chains On Delivery Cars

Many of the chain-equipped cars which I have noticed in use on dry pavements were delivery cars. That is probably to be expected, since the driver of such a car does not pay for the upkeep cost, while he has the labor of removing or replacing the chains. He naturally follows the line of least resistance, saving himself trouble,

alight though it be, at the expense of his employer.

When one or more of the cross chains wears out, as will happen in time, it should be promptly removed, and, as soon as convenient, replaced with a new one; spare cross chains can be purchased at very low cost. A minute's work with a pair of pliers will remove a damaged chain, and the fitting of a new one is almost equally simple. By no means should a broken chain be left free to strike the mudguard with every revolution of the wheel. In the first place, that constant battering cannot do the fender any good, and, if continued long enough, may even wear through the rather thin sheet metal of which it is made. Whether this happens or not, the appearance of the fender will be marred; it will be dented upwards, the enamel chipped and broken, etc. Then again, the noise of the battering chain is very disagreeable, not only to the occupants of the machine, but to the public as well. It savors all the way through of cheapness, as if the machine were a run-down jitney or a delivery outfit of ancient vintage.

Tires in Summer

Probably few drivers realize that there is a difference in consistency in tires in the summer and in winter. Rubber, in its original form is a soft gum. When blended into a compound for tires, although it becomes a much harder and stiffer product, nevertheless the gummy part is still within the compound and softens with heat.

Here a man can take a worthy example from his wife. When the weather is hot, she puts the butter in the refrigerator, cellar or some other cool place where it retains its hardness and remains fresh. Heat and sunlight has the same effect on tires as it does on butter. The rubber will first become softer than it would be in winter driving and later will rot, just as butter will become rancid, and will crack and generally go to pieces. For this reason a car should not be left in the hot sun without the tires being covered and the spare should always have a cover on it.

Our southern readers who now drive in warm weather will profit by this advice. I once knew a man who carried four pieces of oil cloth in his tool box at all times. He put them over his tires at every extensive stop.

of the appropriations; the state treasurer is to refuse to pay it; the treasurer will be mandamus to pay; and the case will be at once taken to the supreme court, it is said.

War Brings More Roads—Though road funds in Great Britain have been greatly curtailed by the demands for military purposes, new work has been going on all the time. New roads are needed for military reasons, and improvements and maintenance of the old also are necessary. The road board has carried about \$9,200,000 worth of work for the war department; \$293,000 for the admiralty; and \$290,000 for the ministry of munitions.

Clubs and Associations

600 Join State Club—The Georgia State Automobile Association was organized less than two months ago with Wylie West, Atlanta Firestone representative, as temporary chairman. Since then 600 have applied for membership.

Bridgeton Dealers Organize—Dealers representing about twenty makes of motor cars at Bridgeton, N. J., have formed the Bridgeton Automobile Dealers' Association. Joseph W. Acton of the J. R. Elwell agency for the Olds, Oakland and Hudson, is president, and Oliver P. Riley of Riley Bros., agents for Chalmers and Briscoe, secretary-treasurer.

Motor Club to Exhibit—The Ottawa Valley Motor Club will hold a motor car exhibition at Ottawa, Ontario, soon. The object is to educate public opinion in favor of the speedy construction of the Ottawa-Prescott highway. Models of good roads will be on display, and addresses will point out the benefits accruing to the general community from improved highways.

K. C. Club Gains 700—His past record put F. F. Rozelle back into the presidency of the Automobile Club of Kansas City. The club has a net balance of \$15,000 and has gained 700 members during the last year. Other officers are: Vice-presidents, Richard H. Wiles and E. E. Nace; secretary, W. P. M. Stevens, and treasurer, W. O. Catron. The club plans to build a second downtown garage and clubhouse during the coming year.

Largest Virginia Association Elects—John A. Leuner has been re-elected president of the Tidewater Automobile Association. This organization is the largest of its kind in Virginia in spite of the fact that it is only 5 years old. Its members number 909, fifty-five of whom joined at the last meeting. Other officers are: Vice-presidents, W. S. Benton and General C. C. Vaughan; secretary, Harry O. Nichols, and treasurer, W. F. H. Enos.

Atlanta Dealers Organize—The Atlanta Automobile Association has been organized with practically every branch house and distributor in Atlanta, Ga., represented in it. It is estimated that motor cars and accessories create more than \$50,000,000 of the city's total annual bank clearings. Officers are: President, George D. McCutcheon; vice-presidents, Robert H. Martin and R. N. Reed; secretary, K. T. McKinstry, and treasurer, J. W. Goldsmith, Jr.

Another Ontario Association—Hamilton, Ontario, is the latest Canadian city to form a motor car association. The organization was made late in 1916, and one of the first steps was to adopt a cash basis policy for all business. Members have arranged a schedule for garage storage, and the price for labor in repair work has been fixed at 75 cents an hour for ordinary operations and \$1 an hour for experts. The association is now working on a scheme for a clearing house for used cars. An appraiser would set the valuation after an examination of a car, and this valuation would be recognized by

all members. A commission basis is proposed, and the used cars of any one make would be returned to the Hamilton representative of that make.

Quebec Owners Organize—Motor car owners of the District of Huntington, Quebec, have formed the Huntington Automobile and Good Roads Association. They expect to enroll 300 before the coming season.

Farmers' Club Does Good Work—A farmers' club of only six members in four years has done more for the good roads movement of West Virginia than any other similar organization, it is said. This is the Ravenswood Farmers' Club of Ravenswood, Jackson county. The club was instrumental in building the county's only hard roads, 3000 ft. on the Ravenswood and Ripley pike. The club induced the governor to set good roads day,

Coming Motor Events

RACES —1917—

May 19—Metropolitan Trophy, New York speedway.
 †May 30—Indianapolis speedway.
 †June 9—Chicago speedway.
 June 23—Cincinnati speedway.
 †July 4—Omaha speedway.
 †July 14—Des Moines speedway.
 †July 29—Tacoma speedway.
 August 4—Kansas City speedway.
 †September 3—Cincinnati speedway.
 †September 15—Providence speedway.
 †September 29—New York speedway.
 October 6—Kansas City speedway.
 October 13—Chicago speedway.
 October 27—New York speedway.

†A. A. A. championship events for 1917.

SHOWS

January 20-27—Detroit show.
 January 20-27—Montreal, Can., show.
 January 22-27—Oklahoma City show.
 January 22-27—Rochester, N. Y., show.
 January 23-27—Allentown, Pa., show.
 January 23-27—Baltimore show.
 January 25-27—Asheville, N. C., show.
 January 27-February 3—Chicago show.
 January 27-February 3—Columbus, Ohio, show.
 January 27-February 3—Richmond, Va., show.
 January 27-February 3—Portland, Ore., show.
 January 27-February 5—York, Pa., show.
 January 28-February 3—Wilmington, Del., show.
 January 29-February 3—Buffalo show.
 February 3-10—Minneapolis show.
 February 5-10—Bangor, Me., show.
 February 10-17—San Francisco show.
 February 10-17—Hartford, Conn., show.
 February 12-17—Kansas City show.
 February 12-17—Louisville, Ky., show.
 February 12-17—Nashville, Tenn., show.
 February 13-16—Grand Forks, N. D., show.
 February 13-16—Fargo, N. D., show.
 February 13-17—Sioux City, Ia., show.
 February 14-17—Peoria, Ill., show.
 February 19—Pittsfield, Mass., show.
 February 19-24—Bridgeport, Conn., show.
 February 19-24—Des Moines, Ia., show.
 February 19-24—Duluth, Minn., show.
 February 19-24—Grand Rapids, Mich., show.
 February 19-24—St. Louis show.
 February 19-24—Syracuse show.
 February 21-24—Flint, Mich., show.
 February 24-March 4—Atlanta, Ga., show.
 February 26-March 3—Omaha, Neb., show.
 February 26-March 3—Great Falls, Mont., show.
 February 26-March 3—Utica, N. Y., show.
 March 1-3—Urbana, Ill., show.
 March 3-10—Boston show.
 March 3-10—Washington, D. C., show.
 March 5-10—Bridgeton, Conn., show.
 March 6-10—Fort Dodge, Ia., show.
 March 7-10—St. Joseph, Mo., show.
 March 14-17—Davenport, Ia., show.
 March 14-17—Mason City, Ia., show.
 March 18-23—Cedar Rapids, Ia., show.
 April 4-7—Stockton, Cal., show.

on which everybody gets out and fills up chuck holes and drags the public highways. Captain J. M. Adams is president and S. S. Ball is secretary-treasurer.

To Form Quebec League—The Automobile Club of Canada, Montreal, plans to call a meeting for the formation of a Quebec Motor League, which would be a central organization with influence in provincial affairs.

Denver Club Aids Tourists—The Denver Motor Club aided 25,000 visiting tourists in 1916. Other thousands, already equipped with guide books and wide traveling experience, obtained road information to scenic points in the mountains. The information bureau served as many as 250 persons a day. Mail inquiries also were answered. Foreign countries represented by the visitors were Canada, Mexico, the Hawaiian Islands, Australia, New Zealand and China. Membership in the club reached 1300 this year. Five hundred miles of road were signboarded by the club during the year, and many improvements in bridges and roads were obtained by them.

The Show Circuit

Bridgeton Show Assured—Bridgeton, N. J., will hold its second annual motor car show in the Preston building, March 5-10. Twice the amount of floor space available last year is provided. Accessories will be shown.

K. C. Show Space Is Scarce—The management of the Kansas City show has enough applications to fill one more floor than the Case building has. The cars will occupy four floors, or about 200,000 sq. ft. The accessories will have one floor. Entries closed Jan. 20. The show dates are Feb. 12-17.

Nashville Show in Hippodrome—More than 25,000 persons are expected to attend the Nashville, Tenn., show at the Hippodrome Feb. 12-17. A carload of amilax has been ordered from Georgia for use in the decorations. Dealers from Kentucky, Alabama, Georgia and Mississippi are to attend.

Stage Set for Columbus Show—Arrangements have been completed for the annual Columbus, Ohio, show, which will be held at Memorial Hall Jan. 27-Feb. 2. Thirty-six dealers will exhibit about sixty-five makes of pleasure cars. Several trucks will be shown. The show is under the auspices of the Columbus Auto Show Co., which is composed of representative dealers of Columbus.

Sioux City Admits Accessories—For the first time accessories will be shown at the Sioux City, Iowa, show. Ninety-two per cent of the space in the auditorium and annex was allotted more than a month before the exhibition, which is to be Feb. 13-17. An overland four-passenger club roadster will be given away on the closing night of the show.

Thirty Take Tractor Space—Increasing interest in tractors is indicated in the reservations for space at the Kansas City tractor show, Feb. 12-17, on the Union Station plaza. Practically all space is taken, and motors are being installed to operate the tractors and other farm power machinery. About thirty exhibitors have made definite arrangements for displays.

Fifty Makes at Des Moines—Reservations have been made for fifty makes at the Des Moines, Iowa, show, Feb. 19-24. Six accessory concerns have taken space. Last year the attendance was 32,000, a gain of 7,000 over 1915. The show decorations will be red, white and blue. Entertainment features include bands and the La Salle Grand Opera quartet of Chicago. Des Moines truck dealers will show at the auditorium while the motor car show is at the coliseum. Three-fourths of the available floor space has been taken by concerns representing fifteen makes of trucks.

of \$300,000. Stockholders who petitioned for dissolution and also declared the company has made no profits and has no prospect of any.

Kelly-Springfield Tire Co.—The Kelly-Springfield Tire Co., New York, has declared the regular quarterly dividend of \$1 a share on common, payable Feb. 10 to stock of record Jan. 15.

Walters Joins Chicago Agency—Belmont Walters, formerly territory representative for the Hupp Motor Corp., has joined the wholesale selling organization of the Schillo Motor Sales Co., Hupmobile distributor, Chicago.

Manufacturers Meet at Toledo—Makers of motor cars and accessories from all parts of the country attended the third annual get-together meeting of the Champion Spark Plug Co. Jan. 20. More than 800 invitations were issued.

Wisconsin Agency for Chalmers—The Chalmers-Wisconsin Co. of Milwaukee has been organized to take over the Wisconsin distribution of the Chalmers, which has been handled by the Chicago Chalmers branch since Harry Newman, Inc., went out of business.

Johnson Leaves Nash for Jordan—J. Fred Johnson, assistant purchasing agent of the Nash Motors Co. and its predecessor, the Thomas J. Jeffery Co., Kenosha, Wis., has resigned to accept the position of manager of purchases of the Jordan Motor Car Co., Cleveland.

Alter Motor Co. to Liquidate—The Alter Motor Co., Plymouth, Mich., has petitioned the circuit court to appoint a temporary receiver to wind up its affairs. Paul W. Voorhels was made receiver. The company states that inability to secure sufficient working capital is the cause for liquidation. The concern has been in business since January, 1914, and has made about 1000 cars.

Tire Makers Open Banks—F. A. Selborling, president of the Goodyear Tire & Rubber Co., J. Danzel of the American Hard Rubber Co. and M. O'Neil, president of the General Tire & Rubber Co. have organized a bank for the benefit of the rubber workers in East Akron, Ohio. Firestone Tire & Rubber Co. and Miller Rubber Co. officers have opened one for workers in West Akron. Foreign departments have been installed.

Coast Dealers Plan Meeting—Chevrolet dealers of the Pacific coast will meet at Oakland during the San Francisco show Feb. 10-17. Two hundred or more dealers from the territory tributary to the factory in Oakland will attend the convention, with many of their agents. The convention is to open the same day as the Pacific Coast motor car show, and on opening night the dealers at the convention will attend the show together after a dinner by the officers of the factory.

Chalmers Adds to Holdings—Thirteen acres have been added to the holdings of the Chalmers Motor Co. in Detroit. Conner's creek will be moved to the eastward to make possible the extension of the plant of the company in that direction. Hugh Chalmers, president of the Chalmers Motor company, personally supervised the laying out of plans for the removal of the creek, probably the first time that a fairly large-sized stream has been removed to make room for a motor car factory, and the plans for a new factory structure are being considered.

New Ford Assembly Centers—The Ford Co. of Canada has discontinued the assembly of cars for Toronto, Montreal and Winnipeg at its Ontario factory, and Ford cars will now be assembled in branch factories in those cities. Manufactured parts are being shipped to the Montreal, Toronto and Winnipeg branches in carload lots. It requires thirty-six carloads for the assembly of 400 Ford

cars. The new arrangement provides improved shipping, as it permits shipment from three territorial centers instead of one point. The London, Ont., branch is to become an assembly factory and distribution point.

Standard Steel Tube Co.—The Standard Steel Tube Co., Toledo, Ohio, has increased its capital stock from \$150,000 to \$600,000.

Pennsylvania Rubber Co.—The Pennsylvania Rubber & Supply Co., Cleveland, Ohio, has increased its capital from \$75,000 to \$300,000.

Marathon Tire & Rubber Co.—The Marathon Tire & Rubber Co., Cuyahoga Falls, Ohio, has increased its capital from \$500,000 to \$1,000,000.

Overland Building in Detroit—The Overland Stores Co., Toledo, Ohio, has contracted for the erection of a three-story building for sales and service purposes in Detroit.

Ford Plant at Des Moines—The Ford Motor Co. is erecting a Des Moines, Iowa, plant which will cost \$600,000 and employ 600 men at an estimated total daily wage of \$3,000.

Three Join McQuay-Norris—Three mechanical engineers, H. C. Coleman, Carl E. Finch and H. R. Souther, have joined the McQuay-Norris Mfg. Co., St. Louis.

Selas Co. to Double Force—The force of the Selas Mfg. Co., maker of motor car horns and lamps, will be increased from sixty to 135 workers as soon as the new building the company is erecting is completed.

Four Drive Co. Elects—E. J. Jenkins has been elected president of the Four Drive Tractor Co., Detroit. Other officers are: Vice-president, J. Allen; secretary and treasurer, A. Johnson.

Agency Has Fire Loss—The salesroom and building of the M. S. Brigham Motor Car Co., Western Washington agent for the Cadillac, Seattle, have been partially destroyed by fire. Ten machines were burned, and the total loss is not at \$80,000.

Firestone Plans New Branch—Toledo, Ohio, is to be the central distributing point for parts of Ohio, Indiana and Michigan for the Firestone Tire & Rubber Co. The company will erect a building with about 15,000 sq. ft. of floor space and employ forty men there.

Hancock Employees Get Bonus—The Hancock Mfg. Co., maker of accessories, this year will share \$5,000 with its employees, this being a certain percentage of the profits of last year. Forty-two of the 170 employees of the company will benefit, each man receiving his share in four equal quarterly payments.

Sheen to Manage Accessory Branch—Roy Sheen has been appointed manager of the Portland, Ore., branch of the wholesale accessory house of Hughson & Merton. He succeeds E. O. Johnston, who resigned to join the sales organization of the Weed tire chain company.

Bosch Magneto Men Meet—Bosch magneto distributors and service men held their annual convention in Chicago, Jan. 22-24. Three sessions were held daily to consider subjects of new apparatus, technical information, service policies, sales promotion and advertising work. Representatives of the main office in New York gave talks.

Bird Goes to Pangborn Corp.—Charles T. Bird has become associated with the Pangborn Corp., Hagerstown, Md., as vice-president and works manager in charge of engineering and production. Until Jan. 1 Mr. Bird was with the Mott Sand Blast Co. Several years ago he was sales engineer for the Pangborn Corp.

Ten Broeck to Spin Yarn—Stockholders of the Ten Broeck Tyre Co., Louisville, Ky., have authorized the installation of a cotton mill plant in which to spin yarn and weave

fabrics for the company. H. L. Lewman was re-elected president at the same meeting. Other officers are: Vice-president, Fred Haupt; secretary and general manager, W. C. Lewman; and treasurer, W. N. Cox.

Standard Screw Products Co.—The Standard Screw Products Co., Detroit, has increased its capital from \$100,000 to \$250,000.

Hill Leaves Willys-Overland—Fred Hill, factory representative of the Willys-Overland Co., has resigned to act as retail sales manager for the Paige Motor Sales Co. in Seattle.

New Plant at Toledo—The Belmont Motor Car Co., incorporated for \$125,000, will build a factory at Toledo, Ohio. The new Belmont car is designed by Andrew N. Lehr, president and general manager.

Agent for Kelly-Springfield—The Waterhouse-Sands Motor Car Co., Seattle, has taken the agency for the Kelly-Springfield tire in Seattle and vicinity. D. H. Couslin is manager.

Cutler-Hammer Gives Bonus—The Cutler-Hammer Mfg. Co., Milwaukee, Wis., has granted a bonus of 10 per cent of yearly wages and salaries to its employees. This affects 2400 workers.

Bradford Leaves UBL Corp.—C. C. Bradford, for several years sales manager of the U. S. Light & Heat Corp., Niagara Falls, N. Y., has resigned. No announcement has been made of his plans.

Cadwallader Heads Seneca—Ira Cadwallader has been elected president of the Seneca Motor Car Co., formerly the Fostoria Light Car Co., Fostoria, Ohio. Other officers are: Vice-president, Charles Ash, and secretary-treasurer, J. H. Jones.

Firestone Banquet for FenFar Co.—The Firestone Tire & Rubber Co. gave a banquet recently to the officials and employees of the FenFar Co. of Cleveland, one of the Firestone agencies. During the banquet R. J. Firestone, R. E. Lee and A. G. Partridge of the Firestone company made addresses.

Takes Over Superfactor—The Hard Mfg. Co., Buffalo, N. Y., has taken over the Willet Superfactor, a device consisting of an auxiliary air valve system for attachment to the intake manifold, and will manufacture and market it. Heretofore the Superfactor has been made by the Buffalo Appliance Co.

New Shock Absorber Company—The Climate Shock Absorber Co. has been incorporated in Michigan and will make shock absorbers at Benton Harbor. The company will operate in a plant owned by the Baker-Vawter Metal Co. Officers are: President, W. A. Vawter; vice-president, John Stearner; secretary, F. E. Coombs; and treasurer, W. A. Vawter.

Coast Company Extends Agency—The Pacific Kieselkar Co. of Portland, Ore., has taken the agency for the Ford car in Portland and Western Oregon. Its Seattle branch has taken the agency for the Federal truck. This latter agency has been handled by the Gerlinger Motor Car Co. for two years, but the Gerlinger company plans to devote its entire time to the Gersix truck.

Star Rubber Co. Launched—Production has started in the plant of the Star Rubber Co. at Akron, Ohio, and every effort is being made to place the factory on a basis of complete production as rapidly as possible. Dan Zelsloft, known as the Little Captain, has joined the sales force of the company. Mr. Zelsloft has been in the tire business since 1901 when he started building tires for the B. F. Goodrich Co. Nine years later he was press agent for the Goodyear Tire & Rubber Co. He joined the Miller Rubber Co. in 1912 as sales and advertising manager and in 1913 took up the same lines of work with the Marathon Tire & Rubber Co., remaining with

this company until he resigned a short time ago to join the Star Rubber Co., manufacturer of the Star Hand-Made tire.

Oakes Co. Increases Capital—The Oakes Co., Indianapolis, maker of motor car accessories, has increased its capital from \$250,000 to \$450,000.

Gem Securities Are Approved—The Michigan Securities Commission has approved the securities of the Gem Motor Car Corp. of Grand Rapids, Mich.

Purvin Heads Chicago Office—M. A. Purvin has been appointed manager of the Chicago office of the United Smelting & Aluminum Co., New Haven, Conn.

Bosch Magneto Men Meet—Bosch mag-all members. A commission basis is pro-has done more for the good roads movement Nashville, Tenn., show at the Hippodrome Columbus, Ohio, show, which will be held at

Farnham to Gibson-Hollister—Frank R. Farnham, formerly with the McGraw Publishing Co., has been appointed directing sales and advertising manager of the Gibson-Hollister Mfg. Co., Boston.

Slater Gets New Position—W. J. Slater has been appointed special representative of the general sales department of the Firestone Tire & Rubber Co. He was formerly manager of the sales promotion department of the company.

Saginaw Motor Co. Elects—The new officers of the Saginaw Motor Car Co., Saginaw, Mich., are: President, J. A. Chmmerer; vice-president, J. W. Grant; secretary, W. C. Welchman; treasurer, H. L. Oppenheimer; and general manager, L. J. Lampe.

Olympian Car Production Started—Production of cars by the Olympian Motors Co., Pontiac, Mich., has started at its factories. The models will be shown for the first time at the Detroit show, Jan. 20-27, and at the Hotel Sherman at the time of the Chicago show.

Patent Sale Is Reported—It is reported that R. K. Thomas, head of the Electrical Equipment Co., Los Angeles, has sold his patent for a vacuum foot brake to Carl G. Fisher, J. A. Allison and other associates of Indianapolis. The basis of the sale is that of a royalty.

Bonniwell with H. W. Heegstra, Inc.—C. A. Bonniwell has joined the staff of H. Walton Heegstra, Inc., merchandising and advertising service of Chicago. Mr. Bonniwell for the last two years has been assistant sales and advertising manager of the Auburn Automobile Co., Auburn, Ind.

Apperson Buildings Completed—The Apperson Bros. Automobile Co., Kokomo, Ind., has completed the last of the new buildings and has transferred all the machinery from the old plant to the new. The new plant gives it an additional floor space of nearly 500,000 sq. ft. and practically doubles the acreage of buildings. Nearly \$300,000 has been invested in new machinery and in buildings together.

Brazilian Graphite for Sale—American purchasers are desired for Brazilian graphite, which is being offered at about \$275 a metric ton, f. o. b. Rio de Janeiro. Samples of the product may be inspected at the United States Bureau of Foreign and Domestic Commerce or its district offices. The name of the exporter may be obtained from the bureau.

Kent Motors Offers Stock—The Kent Motors Corp., New York, is offering 25,000 shares of stock for subscription at \$6.50 a share. The capital stock of the company is 200,000 shares full paid and non-assessable, par value of \$10 each. Nagel & Simpson are managers of the underwriting syndicate. The company has bought 16½ acres of ground at Belville, N. J., valued at \$85,000, and is building a plant which will cost about \$200,000. Three

buildings have been completed, namely, the body plant, the machinery and the assembling plants. The fourth, a metal working plant, is now in course of construction.

Roe with Nelson—J. G. Roe, who was connected with the Hupp Motor Car Corp., has joined E. A. Nelson and will look after sales details for the new Nelson car.

Discontinues Grand Rapids Retail Sales—The Ford Motor Co., which discontinued its service department at Grand Rapids, Mich., in December, has now discontinued its retail sales there and will sell cars at wholesale only.

Ayers Fisk Sales Manager—F. H. Ayers has been appointed sales manager of the Fisk Rubber Co. of New York, with headquarters at the company's general offices at Chicopee Falls, Mass. Mr. Ayers has been with the Fisk company for many years and was formerly supervisor of districts.

Nolen and Thurnau Change—Edward M. Nolen and F. W. Thurnau, specialists in motor car advertising, have recently become connected with Vanderhoof, Condict & Comrie, advertising agents, Chicago. Mr. Nolen is vice-president and the director of merchandising. Mr. Thurnau for the last three years has been associated with Dunlop Ward Co.

Briggs-Detroit Settlement—Creditors of the Briggs-Detroit Co., which failed in March, 1914, will receive about 25 per cent of their claims. The total claims allowed were \$483,287, and total realized assets, \$143,432. Taxes amounted to \$5,177; preferred creditors have been paid \$30,359; labor claims amounted to \$2,461, and dividends paid unsecured creditors were \$77,287. The trustee still retains a balance of \$12,227.

Chile Firm Wants Motor Truck Agency—A Chile firm wants an agency for a motor truck chassis with a four-wheel drive, according to the American consular office in that country. Quotations should be made f. o. b. New York. The firm will pay cash. Information may be obtained from the United States Bureau of Foreign and Domestic Commerce.

Reo Workers Co-operate—Employees of the Reo Motor Car Co., Lansing, Mich., have arranged to reduce the cost of winter motor-ing. They designate certain individual workers to use their motor cars for specified periods, and these drivers pick up all other employees on their way to the factory. Once a week operating expenses and repair bills are audited and the total prorated among the riders. The owner of the car has the use of it at all other times.

National Rubber Co. Expands—The National Rubber Co., Pottstown, Pa., is offering its common stock for investment. The stock is being sold at \$12.50 a share and is now drawing 8 per cent. It is full profit sharing, carries voting power and is non-assessable. This company has been in existence four years and has grown in that time nearly 1000 per cent. It has a new five-story cement, steel and glass factory of which two floors are completed and in operation.

Russia Offers Opportunity—J. Gardner Shelley, expert technician and engineer for the Packard Motor Car Co., Detroit, has just returned from a 10 months' business journey through Russia and sees vast opportunities for the development of the motor car industry there by American makers. He speaks of a decided preference for American made cars. Mr. Shelley visited Moscow, Kiev and many other cities, as his duties consisted to a large extent of instructing Russian engineers in the technicalities of repair work on different types of cars, including transportation trucks and armed motor cars. He stated that the average Russian regards the motor car as a great novelty and that they go into raptures

over it, spending day and night in the study of its parts and mechanism.

Fire Visits Factories—The Paige-Toledo Co. and the States Motor Co., Toledo, Ohio, lost \$18,000 by fire recently.

To Make Safety Device—The Auto Safety Light Co. has been formed at Dayton, Ohio, to make a safety control for motor car headlights. Men organizing the company are G. F. Dadey, George Holland, G. T. Deal and J. M. Weigand.

To Sell Tire Company—The plant of the Toledo-Findlay Tire & Rubber Co., Findlay, Ohio, has been ordered sold at a receiver's sale. V. T. Splitter is receiver. The company was organized two years ago with a capital of \$300,000.

Griffin Gets Kellogg Appointment—A. R. Griffin has been appointed production and general factory manager for the Kellogg Mfg. Co., Rochester, N. Y. Mr. Griffin was at one time with the Studebaker Corp. and, more recently, with the Timken-Detroit Axle Co.

Amazon Names New Board—The following men have been made directors of the Amazon Tire & Rubber Co., Akron, Ohio: L. J. Schott, L. F. Smith, C. M. Bettler, F. B. Richards and Albert Kroeble. The officers are: President and secretary, L. J. Schott; vice-president, L. F. Smith, and treasurer, C. R. Bettler.

Saxon Makes Record Shipment—The Saxon Motor Car Co., Detroit, shipped 3,016 cars in December. This is the largest December shipment since the organization of the company and the third largest month on record. It represents an increase of 1,629 cars, or 117 per cent, over the shipment for December, 1915.

Firestone to Build in Toledo—A central distributing plant for parts of Ohio, Indiana and Michigan in Toledo is being planned by the Firestone Tire & Rubber Co. The company expects to erect a building with 15,000 sq. ft. of floor space and will employ 40 workers. Temporary quarters will be established soon with G. E. Burkit as manager.

Ford Sales Co. Builds Plant—The Ford Sales Co. of Flint, Mich., will erect a large garage and assembly plant with stock rooms, sales rooms and offices. Machinery and equipment will be furnished by the Ford Motor Co., and the plant will be constructed after a model approved by the Ford Motor Co.

Dearborn Truck Reorganizes—The Dearborn Motor Truck Co. of Chicago has been reorganized as the Dearborn Truck Co. with a capitalization of \$550,000. S. D. Porter, formerly vice-president and general sales manager of the Smith Form-A-Truck Co., has bought an interest and is vice-president, treasurer and general manager.

Dort Representatives Meet—Fifty-five members of the sales organization of the Dort Motor Car Co. gathered at Flint, Mich., for the first annual Dort sales banquet. The large dealers and distributors for the company, including representatives from all parts of the country as well as those of the Gray-Dort organization in Canada, attended the 2-day meeting, over which J. D. Mansfield, general sales manager, presided.

Hagberg Rubber Co. Reincorporates—The C. A. Hagberg Rubber Co., Wichita, Kan., has been reincorporated as the Hagberg Automobile Supply Co., with a capital of \$150,000. Five salesmen cover the company's territory, and one special representative travels in a motor car over two-thirds of Kansas, half of Oklahoma, western Texas, eastern Colorado and New Mexico. The officers of the new company are: President and general manager, C. A. Hagberg; vice-president and sales manager, R. E. Newberry; secretary and treasurer, F. L. Fraser.

Automobiles Cost the Farmer Less Than Ever Before Measured in Farm Products

\$605.00 was the average price of automobiles sold in 1916, according to the Automobile Chamber of Commerce.

Based on the value of farm products (released by the Department of Agriculture) December, 1916, this \$605.00 car, if paid for in farm products, December 1, 1915 and December 1, 1916, respectively, would cost as follows:

WHEAT 659 Bushels 1915	WHEAT 337 Bushels 1916	<p>company was incorporated about three years ago for the purpose of furnishing roller bearings to automobile manufacturers.</p> <p>1916 FARM PRODUCTS WORTH \$13,449,000,000</p> <p>WASHINGTON, Jan. 18.—American farm products attained a gross value of \$13,449,000,000 in 1916, making that year the greatest in point of value of any in the nation's existence. That estimate of the year's gross value of farm crops and animal products, announced by the department of agriculture, exceeds by \$2,674,000,000 the total of 1915, the previous record, and by more than three and a half billion dollars the value in 1914.</p> <p>Crops were valued at \$9,111,000,000 and animal products at \$4,338,000,000. The crop value exceeded that of 1915 by \$2,304,000,000 and of 1914 by \$2,239,000,000. Crops alone in 1916 were worth more than crops and animal products combined in any year prior to 1912.</p> <p>Four crops in 1916 each exceeded a billion dollars in value. The corn product is put at \$2,295,000,000; cotton, \$1,406,000,000; hay, \$1,182,000,000; wheat, \$1,028,000,000.</p> <p>The level of prices paid to producers for the principal crops on Dec. 1, 1916, was about 56.9 per cent higher than a year previous.</p> <p>\$10,000 PER ROOM FOR</p>	CORN 681 Bushels 1916	CORN 1052 Bushels 1915
COTTON 10 2/3 Bales 1915	COTTON 7 1/6 Bales 1916		HOGS 7,000 Lbs. 1916	HOGS 9,400 Lbs. 1915
OATS 1,676 Bushels 1915	OATS 1,155 Bushels 1916		POTATOES 415 Bushels 1916	POTATOES 981 Bushels 1915
BUTTER 2,193 Lbs. 1915	BUTTER 1,759 Lbs. 1916		EGGS 1,588 Doz. 1916	EGGS 1,978 Doz. 1915

Every year finds the farmer with increased profits. Every year finds the city man facing a higher cost of living. The farmer's purchasing power is increasing, while the city man's is diminishing—particularly the purchasing power of the salaried man.

Remember, the farmer has the use for an automobile and has the money to buy one.

STANDARD FARM PAPERS carry more automobile, tire and accessory advertising than any other group of farm papers because these advertisers have found by elimination, that these publications reach the greatest buying power in America.

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Prairie Farmer.....Chicago
Pacific Rural Press.....San Francisco
The Farmer's Wife.....St. Paul
Wallaces' Farmer.....Des Moines
The Farmer.....St. Paul

Indiana Farmer.....Indianapolis
Wisconsin Agriculturist.....Racine
Breeder's Gazette.....Chicago
Hoard's Dairyman.....Fort Atkinson
Ohio Farmer.....Cleveland
Michigan Farmer.....Detroit

Pennsylvania Farmer.....Philadelphia
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Farris-Dunlap Auto Supply Co.,
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The Auto Equipment Co.,
Denver, Colo.
Herring Motor Co., Des Moines, Ia.

The Wheeler-Schebler Carburetor Co.,
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The Equipment Co., Kansas City, Mo.
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Manufacturers Supply Co.,
Philadelphia, Pa.

The Automobile Accessories Co.,
Pittsburgh, Pa.
Ballou & Wright,
Portland, Ore.; Seattle, Wash.
Fred Campbell Auto Supply Co.,
St. Louis, Mo.
Weinstock-Nichols Co., San Francisco,
Los Angeles, Oakland, Calif.
Canadian Fairbanks-Morse Co.,
All principal Canadian cities.

Wheeler-Schebler Carburetor Co., Inc.
Indianapolis, Indiana



MOTOR AGE

1917 SHOW CHICAGO'S BIGGEST

by W. K. Gibbs

COLISEUM, Chicago, Jan. 27 — At 2 o'clock this afternoon, Chicago became the capital of the motor car world and the Coliseum, with its adjoining buildings, the capital. Beginning today with the opening of the seventeenth annual national motor show, Chicago became and will continue to be the motorists' mecca for one week. Within a few minutes after the doors were opened, the wide aisles in the Coliseum were well filled and within an hour the crowd had extended into the Coliseum Annex, the Green building and the First Regiment Armory which are used as overflow buildings, since the monster assumed the magnitude that did not permit of housing the show in the Coliseum proper.

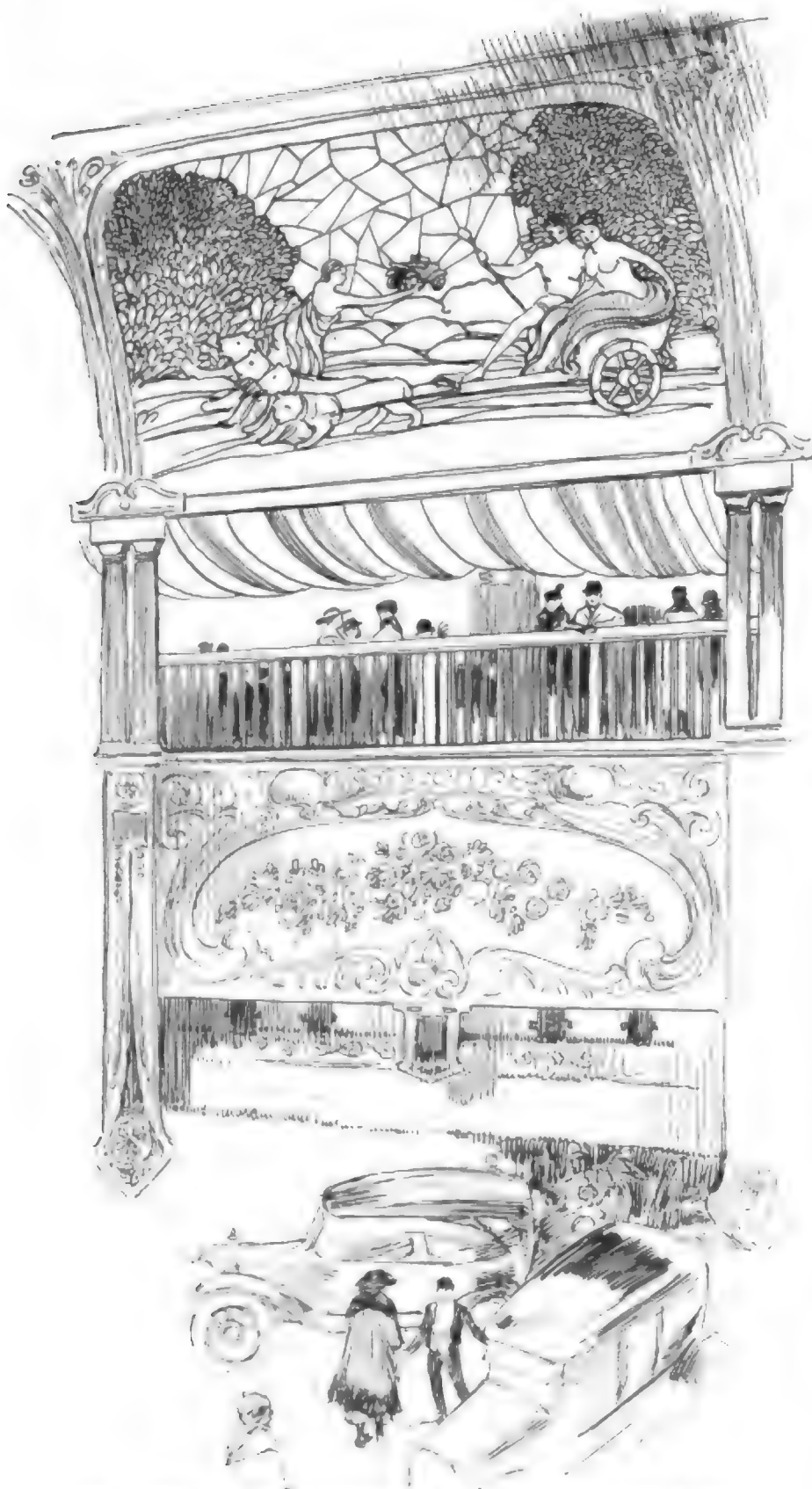
Estimates made tonight at the close of the biggest exhibition of cars Chicago has ever seen, put the attendance at 40,000 which certainly is a new and high record and is looked upon as a strong indication that the attendance this year will go well beyond the million mark but not over.

The most beautiful structures of the motor car industry, as the motorists estimate, were on display to those of a year ago. There were and been told that the big show is a big show, but a big show is a big show, and the big show is a big show. The principal decorations are over the arched top of the Coliseum, whereas last year the Nipponese setting was evident without one having to gaze skyward and withal much more attractive.

Pillars, topped with illuminated globes fashioned after Tiffany art glass, outline the center of the floor space. Little lamps, hundreds of them, hang from the ceiling. Along the lower area of the big Coliseum arch runs a series of symbolic paintings, the stained glass effect of which is heightened by a dull glow of light from behind. Some attempt has been made to carry the effect to the buildings other than the Coliseum, but since the main scheme has found its place overhead, the other buildings do not lend themselves to this kind of decoration so readily. Taken all in all there is too little decoration down where the exhibitors are. However, those who visited the show tonight, when the crowd was the heaviest attendance being given in any direction except skyward impossible so at least they had something attractive to look at, even if it were not cars.

There was much activity this forenoon and up to the time the hands of the clock pointed to 4 o'clock to get exhibits in place and with few exceptions every one was ready when the doors were thrown open to the public. The exhibitors' spaces were about of 2 x 4 blocks. Pathfinder, Austin and Interstate. The Pathfinder exhibit was brought in during the morning hours and the other two were expected to be ready to receive them.

There is little deviation from precedent in the layout of the present show. As usual, the Coliseum main floor is occupied by motor car displays, while the gallery is given over to accessory exhibits. The



Art glass window effects in roof of Coliseum and other decorations as seen by artist

Coliseum annex follows out the same plan occupied by gasoline and electric cars and as that of the Coliseum proper and in addition the balconies by accessories. In addition there are both cars and accessories. One finds few changes in exhibit location in the basement. Only one floor of the Coliseum from last year, although some that Greer building is used and that for cars were in the Coliseum last year are now in only. The main floor of the Armory is the Armory and the other adjacent build-

ings. The leaders in production, however, continue to hold the coveted places.

Comparing this year's exhibit with that of a year ago, it is found that there are twelve more car makers showing to-day than during the 1916 show, the total for this year being ninety-two. Some of this increase is due to the addition of a few makes never shown before and the rest is cars developed within the last year and which made their initial appearance at the New York show. The total number of chassis shown this year is 324, compared with 294 last year. Stripped chassis displays have fallen off slightly, this year's number being fifty whereas fifty-two were shown last year. In almost all cases where a stripped chassis is not shown, there is an engine or some other chassis construction displayed.

Four-cylinder chassis show a loss compared with last year, while six-cylinder chassis show the biggest gain of any type. Of the fours, there are ninety-seven shown as against 106 last year, while sixes total 170 as against 135 in 1916. Forty-one eights are shown this year compared with forty-two for 1916, while this year's showing of twelves is eighteen against eleven last year.

Body Types Interesting Study

Body types offer an interesting study and the casual observer will no doubt at first feel that the industry is giving more thought to open cars than closed. Every type of open car except two- and three-passenger roadsters are shown in greater quantity than last year, the four-passenger roadster which was a child at the beginning of 1916 show, showing prodigious growth in popularity. More than one-half of the total number of exhibitors are showing four-passenger roadsters, while less than 10 per cent are showing three-passenger roadsters which held the stage of popularity a year ago. It seems evident that makers have found a slightly exaggerated cloverleaf seating arrangement to accommodate four passengers is more to be desired than the original cloverleaf pattern to care for only three passengers and consequently they have made body changes to permit the carrying of four, although a number of them have not increased the size of the rear compartment as much as we



Tires Cause Much Power Loss

Efficiency of Engine Two-Thirds Eaten Up Between It and Rear Wheels

PHILADELPHIA, Jan. 25—Two-thirds of the power lost between your engine and the rear wheels of your car is caused directly by the tires. If you run your car with the tires inflated to 30 lb. when they ought to have 80 lb. in them, it takes 25 per cent more power to drive the car along the roads.

So get out your tire pump, motorists, for Professor E. M. Lockwood, head of Sheffield Scientific School of Yale University is authority for these statements. Professor Lockwood gave these somewhat startling figures in a paper before the Pennsylvania section of the Society of Automobile Engineers. His subject was "Power Losses in Pneumatic Tires."

Another important point he made was that these losses remain practically the same regardless of whether you drive 20, 30 or 40 m.p.h. And still another was that all this eating up of power is due directly to the flexure of the tires themselves as they roll over the humps and bumps in the roads. He proved this by calculating how much rise in temperature the absorption of this much power would bring about, which is about 37 degrees; and then he ran one of the tires half an hour at 40 miles an hour and measured the temperature with a thermometer. The test showed that the tire was just 39 degrees hotter than when the run was started.

Deductions

From this, Professor Lockwood deduces that what we really want is a tire that will bend and straighten out again without producing any more heat than a steel spring does. "For," he said, "if we can produce such a tire, a tire in which internal friction has been eliminated, we shall then have a tire that does not absorb any power."

The tests that Professor Lockwood made required the use of special apparatus, the car being mounted on rollers flush with the floor of the laboratory. The car was anchored and the rollers driven by a calibrated electric motor. By first determining the amount of power required, to drive the rollers with the car on them and carrying its normal load and then jacking the car up and determining the power required to turn the rollers alone, the difference gave the actual power required to turn the wheels of the car.

Some of the results are given in the appended tables, the first of these showing the figures from a series of runs made with a light six-cylinder chassis and with a heavier six-cylinder chassis. Professor

Underinflation Is Responsible for Heavier Load on Powerplant Regardless of Speed

Lockwood takes great pains to point out that the tests were not originally intended to determine the power losses in the tires, but that these figures were obtained and are now published because of their interest.

It should be noted in the accompanying table that the pressure in the cord tire was higher than that in the fabric tire, and for this reason the test is perhaps not quite as fair as it might be. Subsequent tests, however, do show that the rolling resistance of the cord tire is considerably less than that of the fabric tire, and furthermore that the rolling resistance of the cord tire does not increase nearly so rapidly with a reduction in inflation pressure as is the case with the fabric tire. This is well brought out by the set of curves given herewith.

From these, it will be seen that the fabric tire inflated to 80 lb. gave a rolling resistance of 30 lb. and when the inflation pressure was reduced to 30 lb., the rolling resistance immediately mounted to 45 lb.—an increase of 50 per cent. With the cord tire, on the other hand, the rolling resistance remains constant for pressures from

80 lb. down to 55 lb., and from here down to 30 lb., the rolling resistance increases only 2½ lb.

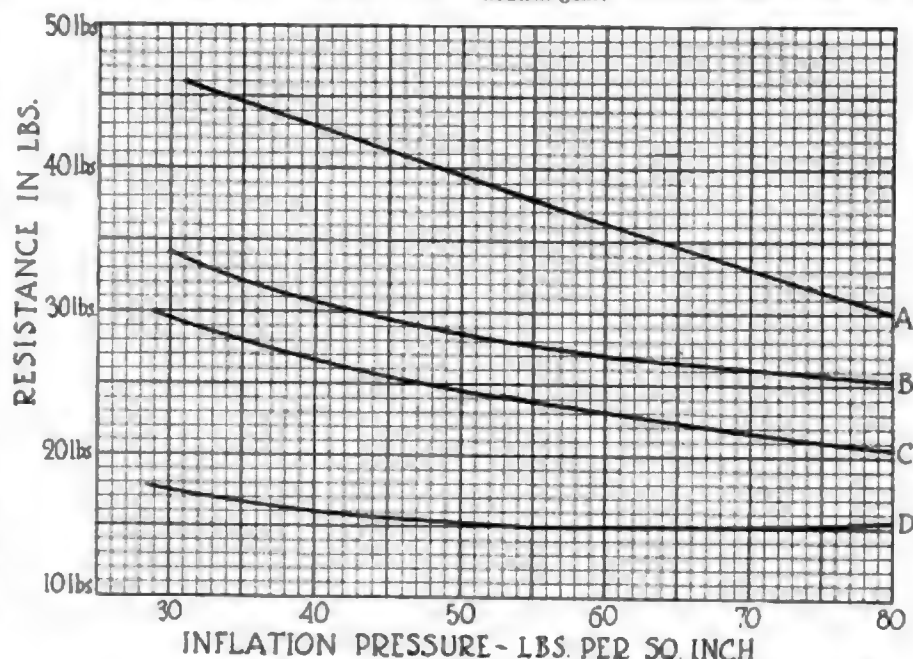
Similarly, the load carried by the tire has an important effect on the rolling resistance, for, the greater the load, the greater will be the flexure of the tire; and as Professor Lockwood has pointed out, the more flexure there is, the greater the heat generated and as it requires power to generate heat, this power is lost because the heat is dissipated into the air.

Summing up, Professor Lockwood says, "Only a limited number of tests of cord tires have been made under conditions permitting accurate comparison with fabric tires. The characteristics of the cord tire are: greatly reduced resistance loss and ability to run at low inflation without much increase of resistance. While these experiments point to the value of cord tires for reducing tire losses, more numerous and exhaustive tests are required covering a wider scope."

		MILES PER HOUR			
		INFLATION PRESSURE		AVER. AGE	
32x4	Cord	60	11.7	11.7	13.3
32x4	Fabric	55	24.1	23.3	24.4
35x5	Cord	..	33.0	33.6	33.8

POWER LOSSES IN 2700-LB. CHASSIS		
	LBS.	PER CENT
Front Tires.....	18.2	31.2
Rear Tires	17.7	30.3
Front Bearings.....	4.7	8.0
Rear Bearings.....	17.9	30.6
	58.5	100.0

*Includes transmission mechanism up to neutral gear.



Curve showing how underinflation of tires adds to resistance of traction. A—Rear wheels, fabric tires, load on each wheel 550 lbs. B—Rear wheels, fabric tires, load on each wheel 550 lbs. C—Front wheels, fabric tires, load on each wheel 550 lbs. D—Front wheels, Silvertown cord, load on each wheel 550 lbs.

of two. The smaller one is 5.1 by 5.5 and the larger 5½ by 7. They are made for high-speed work and have steel pistons with exceptionally light alloy steel rods. The crankshaft is a racing style made rigid and carried on three large main bearings with pressure oil feed for lubrication.

Although the difference in bore in the two motors is 0.15 in., the valves are the same size and are interchangeable. They are 2¼ in. in diameter and are made from tungsten steel. The valve drive is conventional, being through helical gears with the cam layout somewhat similar to that used on racing cars. The cams approach the constant-acceleration type with a long dwell and a quick lift. The clutch is a Borg & Beck disk and the gearbox a three-speed Warner. There is no standard final drive ratio, as this is made up to suit the conditions under which the purchaser is to operate the car.

Axles Specially Cut

An American Ball Bearing floating axle is used. These are special axles cut directly from the billet for the car. In fact, the entire machine is practically hand-built and fitted throughout and, although an assembled car in the final analysis, the parts are in most instances special and designed to meet the high stresses of fast driving. The frame is a product of the Hydraulic Pressed Steel Co., and the wheelbase is 114 in. on both the large and small models. Both sizes carry 33 by 4½ tires and the prices are \$3,500 for the larger car and \$2,650 for the smaller.

The fittings and equipment are quite limited owing to the nature of the bodies. What is provided, however, is of high quality. The electrical equipment, including lighting, starting and ignition, is Bosch. Double ignition is used with two sets of plugs mounted on each side of the T-head engine. The carburetor is a Miller racing type. A speed of 80 m.p.h. is claimed for the smaller and 90 for the larger model.

Locomobile is showing a four-passenger roadster in cream with fine black striping. A green limousine and a cream-colored landaulet are also shown by the same concern. Simplex is exhibiting a cut-away polished chassis as well as an attractive six-passenger touring and a black limousine. The six-passenger body does not carry the extra seats concealed, but folded directly against the backs of the front seats. Brewster is exhibiting a red two-passenger roadster with red cloth upholstery.

There also is a four-passenger roadster in Brewster green which has a neat little feature in the way of plunger door locks which allow the doors to open when they are pressed. Green leather upholstery is used on the driver's seat of a Marmon landaulet made up by the C. P. Kimball company. The interior is finished in green plush.

The Fageol has adjustable front seats which slide back and forth to suit the occupants. It is fitted with a Victoria top which is lined with silk plush. The outside

of the top is mohair. The floor coverings are also of silk plush over the mahogany floor boards. The ventilators in the top of the hood are striking and also tend to relieve the long line of the hood covering the Hall-Scott aviation engine housed within. The sales price of the engine alone is \$5,400.

The Murray and the Daniels cars that were shown at New York are at the Salon. The former exhibits a green seven-passenger touring car and the latter a touring design painted white with mahogany trim.

BOSTON SHOW SPACE ENLARGED

Boston, Mass., Jan. 27—Boston's motor show is swelling to gigantic proportions and now it has been found necessary to add a third building. The main show will be in Mechanic's building, the usual place. There will be the Salon at the Copley Plaza for cars of \$2,500 and upwards, and the overflow will be held at Horticultural hall farther along Huntington avenue, where there was an overflow previously.

The Boston Automobile Dealers Association did not want to have an overflow in the other halls, but so insistent were the late comers who wanted to be identified with it in some way or other that Manager Chester I. Campbell finally had to take it on. He left for Chicago yesterday where he will confer with some of the exhibitors.

Even though it was not generally known that Horticultural hall had been added there was demand enough to fill that place quickly. This will make the Boston show the largest in the country, it is claimed. A few years ago two halls were used, and there was much dissatisfaction because the big show got all the limelight. So this year the exhibitors were told what to expect before they signed up for space. One admission will admit to all three shows, and there is some talk of having the salon open without tickets, as it is to be in the hotel building.

BALTIMORE SCORES SUCCESS

Baltimore, Md., Jan. 27—Baltimore's show, which closed to-night at the Fifth Regiment Armory after a five-day exhibition was the most successful in point of attendance, and sales and prospects developed of the eleven shows that have been held here. General Manager H. M. Luzius, of the show committee of the Baltimore Automobile Dealers' Association and the Automobile Club of Maryland, under whose joint auspices the event was held, declared that this year's show proved to be a bigger success than any of its predecessors, despite the fact that the night charge throughout the week was 50 cents for admission, double the usual night charge, the day charge being 25 cents. The only slight rift to mar the show from an attendance standpoint was that of Thursday night, always billed as "Society Night," on which occasion the custom has been to double

the admission. The prevailing opinion that it would cost \$1 to come Thursday night held back the evening crowd, although the afternoon crowd was very large. For the first time the buying began in the opening days of the show and a canvass showed many healthy sales, some of which were completed on prospects and others developed right at the show.

High-grade cars, all above \$1,000, sold well, and big selling by lines above \$2,000 were also made. The country dealers came to the city early and dealers having the entire state closed many contracts for the season. One distributor reported that for the first time in years his firm was able to get real money from their rural customers at show time for good size delivery orders for the coming year. This experience was typical of many of the other dealers. Not alone did dealers come from Maryland, but Virginia, West Virginia and the Carolinas had representatives in attendance.

This year for the first time the show was exclusively for passenger cars and fifty-three dealers were represented, showing 221 cars. More than 30,000 visited the show, the big attendance day being 7000, which was Friday, there being more paid admissions on that day than on Tuesday evening, the opening night—Automobile Club Night — when about 8000 passed through the gates. The attendance increased about 15 per cent over last year, despite the increase in the admission charge.

LANCASTER SHOW ATTRACTS 20,000

Lancaster, Pa., Jan. 29—Catering to one of the richest agricultural districts in America, the Lancaster Automobile Trade Association held its annual show here last week. Many sales were reported and the event on the whole was the most successful of any ever held by the association. Between 15,000 and 20,000 persons from this city and towns throughout Lancaster county saw the thirty-one makes of cars on exhibition. There were forty exhibitors including accessories.

Lancaster county is known for the wealth of its agriculture. At the present time the value of its farm property is variously estimated at \$85,000,000 which if equitably distributed among the population would give every man, woman and child \$500.

The tobacco crop is the largest in the county and is larger than all the other counties in the state put together. This crop heads all others in size and valuation and gives this city the distinction of being the largest tobacco mart north of the Ohio river. The value of the crop is approximately \$4,000,000. Live stock products are about the same in value.

Cars within the \$800 limit have struck a popular chord in the rural districts particularly, and the prospects at the show were numerous for such cars as the Maxwell, Overland and Ford.

Lifts Restriction on Harroun Stock

Michigan Securities Commission Allows Sale of Issue Under Conditions

DETROIT, Jan. 30.—The Michigan Securities Commission has permitted the Harroun company to proceed with the sale of its stock in Michigan. Owing to the fact that the brokers handling the stock previously had not complied with certain provisions of the Michigan Blue Sky law governing the procedure of brokers in marketing stock, the sale of the issue had been checked. The present decision means that the stock will be again on sale in Michigan.

In making its decision the commission imposed certain conditions which have been accepted by the attorneys for the Harroun company. Briefly, the restrictions are that the \$4,000,000 worth of stock in the hands of the officers of the company must not be sold until the company is able to pay a dividend of 6 per cent on the entire \$10,000,000 capitalization. Legally expressed, the commission holds the stock in escrow until that time.

After the conditions are complied with the company may sell \$1,000,000 treasury stock in Michigan, paying a commission not exceeding 10 per cent to the brokers handling it. Furthermore, all advertising regarding the sale must be submitted to the commission for its approval. The decision is the result of a hearing held before the commission at Lansing, the state capital, on Jan. 25.

KISSEL HAS TWELVE-CYLINDER

Chicago, Jan. 29.—Considerable interest has been aroused among the trade here by the appearance of a twelve-cylinder Kissel. The car incorporates a Weidely twelve-cylinder engine with the regulation overhead valve action. It has been shown privately at the local branch of the company and will be run through a number of severe tests before actually being marketed. The chassis is a larger one than that of the Hundred-Point six model, but conforms in a great many respects to the same design.

ILLINOIS MAY BOOST LICENSE

Springfield, Ill., Jan. 29.—It is reasonably certain that the license fee for motor cars in Illinois will be increased at the present session of the legislature. It is absolutely certain that an advance will be urged and it will probably be enacted unless the unexpected happens. At a recent meeting of the Illinois State Highway Association, held in Danville, a resolution was adopted favoring an increase, especially for the heavier and more powerful cars, the increased revenue to be applied in the building of new roads. S. E. Bradt, secretary, compared the Illinois fee with that of a number of other states, all being larger than that of Illi-

nois. He believed that Illinois should ask the same as neighboring states.

Illinois is boasting a bond issue which will improve 4,000 miles of roads. Every additional dollar that can be raised means better roads for the people who own motor cars. As they are most urgent in seeking improved highways it is argued that they should be willing to pay for them. It was pointed out that every mile of improved roads means a decrease in the expense of operating a car. With good roads a trip of 150 miles might be made on approximately 20 gal. of gasoline. With muddy roads the consumption of gas would be 50 per cent greater. In a single trip of this kind a car owner would save the increased cost of his license fee.

McCLAREN HEADS RACINE RUBBER

Racine, Wis., Jan. 29.—H. L. McClaren former president of the Mitchell-Lewis Motor Co., has been elected president of the Racine Rubber Co., to succeed Stuart Webster, who resigned because of ill health. Mr. McClaren formerly was head of the rubber company, which at that time was owned by the same interests as the Mitchell company. Recently the tire plant was purchased by the Ajax Rubber Co., Trenton, N. J. Mr. Webster will continue as a director and as treasurer of the company.

FAEH HEADS OSGOOD SALES

Chicago, Jan. 29.—A. C. Faeh, formerly advertising manager for Baker R. and L. Co., Cleveland, Ohio, will become sales and advertising manager for the Osgood Lens and Supply Co., Chicago, February 1.

LIBERTY PRICES UP \$100

Detroit, Jan. 26.—The Liberty Motor Car Co., will advance its prices on all models \$100 on Feb. 1. The touring car on that date will advance to \$1,195; close-coupled four-passenger roadster, to \$1,195; the brougham to \$2,450; and the touring sedan to \$1,395. The company will add a Springfield body model about the middle of March. This car will sell for \$1,795.

PREST-O-LITE TO INCREASE CAPITAL

New York, Jan. 26.—The Prest-o-Lite Co., at a special meeting yesterday, plans for increasing the capital stock of the company from 80,000 to 100,000 shares, making the amount of the stated capitalization \$1,000,000, were ratified.

AJAX TO ISSUE NEW STOCK

New York, Jan. 26.—Details in connection with the purchase of the Racine Rubber Co. by the Ajax Rubber Co., having been concluded, application has been made

to list an additional 62,000 shares of Ajax stock on the local stock exchange. Through the purchase of the Racine company the number of shares of stock of the Ajax Rubber Co. has been brought up to 142,000, or \$7,600,000, out of a total authorized issue of \$10,000,000.

At the annual meeting of the Ajax company, to be held in February, the board of directors will be increased from nine to fifteen members and the present retiring directors re-elected. The six new members that are to be added to the board are from Chicago and Racine.

DELCO TURNS TO AVIATION

Dayton, Ohio, Jan. 29.—The Dayton Engineering Laboratories Co., maker of Delco starting, lighting and ignition equipment, has turned its eyes toward the field of aviation. Dayton, being the home of aviation in this country, naturally is keenly interested in aeronautics and the Delco company has established what might be described as a clinic on aviation in the Dayton plant. A large room in which the temperature can be regulated to summer heat or zero is used and aeronautic engines have been put through tests and experiments with various types of ignition equipment therein. These experiments have been carried further by actual flying tests with the equipments so evolved.

BROWN-LIPE ELECTS OFFICERS

Syracuse, N. Y., Jan. 27.—At the annual meeting of the Brown-Lipe Gear Co. officers were elected as follows: Alexander T. Brown, president; Willard C. Lipe, first vice-president; George W. Sponable, second vice-president; Arthur E. Parsons, secretary and general manager, and E. A. Hungerford, treasurer. These, together with H. W. Chapin, make up the board of directors. Mr. Chapin has retired from the general management of the Brown-Lipe Gear Co., to devote his entire attention to the management of the Brown-Lipe-Chapin Co.

BONDS FOR EVERY CAR OWNER?

Albany, N. Y., Jan. 26.—New York car owners will have to accompany their applications for registration with a \$5,000 bond, to be approved by the secretary of state, if a bill just introduced in the legislature becomes a law, unless such owner shall state in his application that he is insured in an equal amount in an insurance company. This is to cover payment of any judgment recovered against the owner in the operation of his car.

FIGHT PROPOSED TRUCK TAXATION

New York, Jan. 27.—Action was taken here this week by motor truck interests of the state protesting against the passage of a bill proposing a new schedule of taxes for motor trucks and buses. The new schedule will increase the fees from double to fourteen times the present charge. The protest is made on the basis that the com-

mission which formulated the schedule did not perform its duty under the law which created it in that the fees as proposed are not based upon the time of use of roads or of the wear caused on such roads, but simply on gross weight and seating capacity of buses, and that the present fees be continued in force until such time as a new commission be appointed by the state to determine a scientific basis of taxation, based on the road wear of all types of vehicles, including motor trucks, passenger cars and horse drawn wagons.

GEMCO GETS ANOTHER INJUNCTION

Milwaukee, Wis., Jan. 27.—A decision made in the United States district court of the eastern district of Wisconsin, orders the Shadbolt & Boyd Iron Co., Milwaukee, to stop selling Gemco bumpers as covered by G. F. Discher's patent. Mr. Discher is the head of the Gemco company.

LOUISVILLE COMPANY INSOLVENT

Louisville, Ky., Jan. 27.—The Kentucky Automobile Co., a Louisville concern, was named in an involuntary bankruptcy petition filed by creditors in the United States district court here this week. The claim is set forth that the insolvency of the defendant company recently was established when another creditor, Sam B. Weatherby, obtained a judgment for \$450 on account in the circuit court and the sheriff advertised a sale of property to satisfy the claim.

SNOW LEAVES NASH

Kenosha, Wis., Jan. 29.—Fred A. Snow, for five years chief metallurgist of the Thomas B. Jeffrey Co., Kenosha, Wis., and its successor, the Nash Motors Co., has resigned to engage in business on his own account as a consulting metallurgist and to establish a commercial heat-treating plant in Chicago. He will leave Kenosha on Feb. 1.

MORSE CHALMERS G. M.

Detroit, Mich., Jan. 27.—E. C. Morse, who has been vice-president of the Chalmers Motor Co. for several months, is now general manager as well as vice-president. Mr. Morse was commercial manager of the E. R. Thomas Co., in 1907, and went to the Chalmers organization during its early years, having the management of sales until Oct., 1916, when he resigned that position to become vice-president.

EMERSON OLDS SALES MANAGER

Lansing, Mich., Jan. 29.—P. L. Emerson has been appointed sales manager of the Olds Motor Works, this position having been vacant since the resignation of Jay Hall last July. Emerson was the organizer of territorial divisions for the Racine-Sattley Co., manufacturer of agriculture implements and vehicles, and also for the John Deere Plow Co.

Texas Gets Greatest Federal Aid

New York Second, Pennsylvania Third and Illinois Fourth in Road Fund Distribution

WASHINGTON, D. C., Jan. 29.—The federal appropriation for the fiscal year ending June 30, 1918, of \$10,000,000 to aid the states in the construction of rural post roads has been apportioned among the several states in accordance with the terms of the Federal Aid road act. In accordance with the provisions of the act, 3 per cent of the appropriation, or \$300,000, was deducted to meet the cost of administering the act. The remaining \$9,700,000 has been divided among the states—one-third in the ratio of area, one-third in the ratio of population and one-third in the ratio of mileage of rural delivery routes. The division among the states follows:

State	Sum appropriated
Alabama	268,297.80
Arizona	137,027.04
Arkansas	165,374.20
California	302,127.84
Colorado	167,380.28
Connecticut	62,180.88
Delaware	36,368.74
Florida	11,952.54
Georgia	268,958.90
Idaho	129,927.00
Illinois	441,852.46
Indiana	271,495.24
Iowa	292,351.26
Kansas	286,414.80
Kentucky	194,943.82
Louisiana	134,949.32
Maine	96,903.00
Maryland	88,094.44
Massachusetts	147,701.90
Michigan	291,567.44
Minnesota	284,788.32
Mississippi	177,811.08
Missouri	389,440.82
Montana	166,571.38
Nebraska	213,541.02
Nevada	128,790.00
New Hampshire	41,093.24
New Jersey	118,425.80
New Mexico	157,476.62
New York	501,449.54
North Carolina	225,766.84
North Dakota	152,289.12
Ohio	374,810.84
Oklahoma	269,278.00
Oregon	167,374.74
Pennsylvania	491,288.34
Rhode Island	23,331.42
South Carolina	143,616.26
South Dakota	161,892.64
Tennessee	228,306.90
Texas	581,855.62
Utah	113,960.30
Vermont	45,688.34
Virginia	189,321.42
Washington	143,768.56
West Virginia	166,540.92
Wisconsin	259,722.14
Wyoming	122,393.64
Total	\$9,700,000.00

This is the second apportionment to be made under this act. For the fiscal year ending June 30, 1917, the appropriation was \$5,000,000. For succeeding years the appropriation is as follows: 1919, \$15,000,000; 1920, \$20,000,000; 1921, \$25,000,000.

These sums do not include the \$1,000,000 which is appropriated each year for ten years for the development of roads and trails within or partly within the national forests.

INDORSE COLORADO ROAD BONDS

Denver, Colo., Jan. 27.—The annual Colorado good roads conventions just closed went on record in favor of a bond issue of \$25,000,000 to \$50,000,000 for road

extension; increasing the power and funds of the state highway commission, remodeling the state motor vehicle license law to provide part-year rates and other changes to encourage car-buying at all times of the year; getting passed a law to make travel safer on all the state's highways, and supporting all practical legislation and other activities for the welfare of motoring and good roads in general.

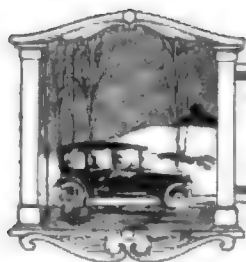
Charles R. McLain, Denver and Canon City, was elected to succeed Elmer E. Sommers, Denver, as president. Mr. Sommers held the office three years, and was again nominated for re-election, but withdrew. The new president has been active in good roads work for several years, and is well known as president and one of the organizers of the Rainbow Route Association, which has developed an excellent 370-mile highway across Colorado from La Junta to Grand Junction, through Pueblo, Canyon City, Salida, Gunnison, Montrose and Delta, crossing the main range of the Rockies at an elevation of 2 miles over Monarch pass, and penetrating some of the grandest scenery in the world.

AVERT FREIGHT CAR EMBARGO

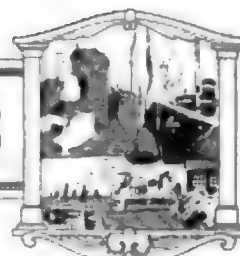
St. Louis, Mo., Jan. 29.—A threatened embargo on all freight for the St. Louis terminals, including shipments to the Southwest, probably has been averted by a drastic cleaning up. As a last resort the Alton bridge across the Mississippi 80 miles north of this city, has been opened to traffic after being closed several years. The Alton Terminal Association will handle southwestern traffic over this bridge. The first order to this terminal under the new routing was to collect 500 cars suitable for motor vehicles and send them to Flint, Mich., and Detroit, to carry to the Southwest shipments of machines that were waiting to be loaded.

WEIGHTMAN BANQUETS SPEED COPS

Los Angeles, Cal., Jan. 26.—William Weightman, III, who won third place in the 1916 Vanderbilt Cup race at Santa Monica and is reputed to be a millionaire, is showing activity while wintering here. In addition to securing financial control of a theater, he is keeping to the fore in other ways. A few nights ago he banqueted eighteen motorcycle police officers in return, he said, for courteous treatment accorded him recently. He explained, when arrested for speeding on the county highway that he had a very important engagement to keep and through the intercession of the officers with the court he was let off with the minimum instead of maximum fine, as the speed of his car would have warranted.



EDITORIAL PERSPECTIVES



The Eternal Show

SO long as "hope springs eternal in the human breast," so long may we expect motor car shows of the Chicago kind to keep gaining in importance. It is the spirit of "to excel" that brings the thousands from the Valley of the Mississippi, and from beyond the mountains. Stop the spirit of change, quell the glow of enthusiasm, stamp out the flame of invention, and you can kill motor car shows. There is no better evidence of the spirit of progress in a people than their keen desire to follow the footsteps of the inventor and the engineer in their additions to science.

■ ■

TO date the development of the motor car has been a mechanical romance without parallel. Never before has any other engineering movement got so into the hearts of the people. Every boy hopes to some day own a car. We hope that no boy or girl will reach their teens or pass through them without feeling the throb of motor progress.

■ ■

THE motor car represents something more in this age than a mere mechanism. It is a permeating influence whose ramifications have no limits. The car represents a spirit of indi-

vidual possibility as worthy of imitation as the deeds of our heroes. It represents not only personal and collective economy, but it stands for a higher goal of individual and national efficiency. Just as the telephone, the railroad, the steamship and the electric light stimulated the mental activity of continents, so today the motor car is stimulating the minds of millions. It is making millions think more quickly and more accurately; it is making millions work more efficiently; it is breeding broader visions of business in other millions; in short, the motor car movement is one whose influence is working in channels never associated with it.

■ ■

THIS leadership manifests itself in one form in the present show, and the enthusiasts have been given a wider and deeper interest in this world, and we would not be overstepping the mark to add a greater interest in the next world and the great future. When too close to a great movement, you miss the perspective, and it will require centuries to write the true story of how much has been done to move this old world along the pathway of evolution by the motor car. It would be a task outside the sphere of any one individual.

Volatility, Not Gravity

IF gasoline makers and Washington officials have their way, the days are numbered when we will inquire as to the gravity of gasoline and another of our old idols will have been shattered. Instead of asking for gasoline of a certain gravity, we will ask for fuel of a certain volatility, or, to put it in other words, will ask for fuel of a certain distillation. Necessity always has and still continues to be the mother of invention, and while our mechanical and electrical engineers have been perfecting motors and magnetos, starters, spark plugs and lighting generators, our chemical or gasoline engineers have been burning the midnight oil in their laboratories. To us their names are unknown, but to our pocketbooks their works mean much.

■ ■

THESE engineers have decided that what we know as Baume gravity means nothing; its usefulness was of yesterday. To say today that a gasoline is of certain gravity does not mean that it is easier to start with than a heavier gasoline. We may have a fuel of 60 gravity that does not volatilize so well in starting as one of 54 gravity. What does count is the percentage of relatively low temperature contents in gasoline. When there are enough of these low-boiling points, we are assured of relatively easy starting. It may be that in a few years we will not only specify the temperature of distillation, but ask for different percentages of fuel, just as today we ask for alcohol with different percentages of pure spirit.

■ ■

ONE of the best results of the gasoline conference in Washington was that it brought business and government together mutually to talk over problems. There is no disputing the gravity of the fuel situation, and it is an indication of

good progress when our government reaches out its hand and says to business, "Let us sit down and talk the subject over with our feet under the same table." Had we not had this get-together we might have had Washington writing some absurd gasoline specifications on the statute books. These specifications would have meant pay for inspectors to see that the fuel would measure up to requirements. Inspectors are very generally associated with possibilities of graft. By the get-together program all of these troubles may be avoided and money saved on all sides.

■ ■

THERE are two sides to the gasoline argument; the oil men do not want the grade of gasoline hedged round with foolish restrictions, because restrictions generally mean reducing the quantity of gasoline that you can obtain from the gallon of crude. That is the one thing we do not want. It seems certain that heavier grades of fuel will have to be used, but this will not prove troublesome, particularly if our gasoline chemists retain enough of the low-boiling points so that the explosion of the charge can be quickly taken up.

■ ■

SOME months ago MOTOR AGE urged a joint committee of gasoline men and motor car manufacturers, so that if a different grade of fuel had to be used, that due notice could be had of such and manufacturers given ample time to prepare for it. The meeting last week in Washington is a good start, and while several car and farm tractor engineers were present, the representation was not so large as the subject demanded. It is hoped this co-operative work will be continued. The motor, car, tractor and aviation engineers should join in the good work.

Fictitious Value of Used Cars

Difference of Opinion Between Dealer and Owner Ever Widening

THE problem of the used car is continually harassing the dealer in cars. The piano trade formerly had its problem in the old squares. Everybody wanted a new upright and many wished to turn in, as part payment, a square which if the owner was to be believed had, like a violin, improved in tonal quality during the years it had been in the possession of the seller.

The fact was, that nobody wanted a square piano and their worth to the dealer was only the value of the wood and other junkable parts. Thousands of these squares were destroyed by fire merely to get them out of the way.

The motor car dealers find that history is repeating itself. More than half the cars sold go to persons who are already the owners of cars, and these invariably find the intrinsic and sentimental value of the old cars remarkably high when a trade is suggested. The dealer, no matter how many new cars he can sell, cannot show profits if he loads up his garage floor space with archaic junk for which there is no market.

Car Depreciation Rapid

Dealers maintain that the depreciation on motor cars is rapid. A new car, if driven but 500 miles and no matter how good its condition, just for the reason that it has been driven, becomes a second-hand machine. As one dealer has expressed it, the success of some owners of second cars in unloading their junk on the dealers in exchange for new demonstrates that they are better salesmen than the dealers.

It is questionable if this depreciation is real. Too many it appears to be fictitious. The years 1909 to 1914 witnessed rapid and radical changes in car construction. Marked body alterations and the addition of refinements and accessories, were noted each year. Finally, motor cars became largely standardized and some well known manufacturers are even boasting that there should be no yearly changes of importance.

A few people will continue to buy cars for a single season, but most purchasers want machines that will give them four to five years' service. With such machines, there is no reason why many hundreds of dollars should be marked off their value as soon as the running gear becomes a little muddy.

On the other hand, cars that have seen long service, and given their owner his money's worth, may be expected to go directly to the junk pile. The motor car is no longer a plaything or luxury. The industry has become established and buying and selling methods have changed for

Solution Found in Illinois—Auction Shows Sale Worth of Second-Hand Vehicles

the better. It is up to the dealers to get together for mutual protection, and standardize the value of the used car for their own protection. While some sales of new cars will be lost, the garages will not be

CAR THIEVES USE MANY TOOLS

Nashville, Tenn., Jan. 26.—To be a regular motor car thief requires almost as large an equipment as it does to run a repair shop, according to local detectives, after arresting two young men charged with wholesale operations along this line. The two young men had in their possession, the detectives state, not only two Ford cars, but tools for chiseling off numbers, a dozen car licenses from various states and tools for removing various parts from cars. At least, this is the interpretation placed by the police on their equipment. They state that the numbers on the engines had been tampered with and the cars altered. It is believed that the cars were stolen in Indianapolis, and that a car stolen here was sold there. It is declared by the police that they are part of a band which has been working in this section.

"PLEASURE" CAR MISNOMER

The question has arisen as to whether or not the term "pleasure car" is not obsolete and likely to become injurious to the motor car industry, and manufacturers discussing this subject point out the wide and erroneous use of the words "pleasure car" even among some motor car makers. They declared that the motor car is no longer a vehicle bought or operated solely in the pursuit of pleasure. Quoting from one manufacturer:

"In the early days of the industry the motor car was a novelty and its use was confined to those seeking recreation or some form of pleasure, but with our economic development the motor car has ceased to be a plaything. It fills utilitarian purpose almost exclusively, and in many cases instead of being a luxury it is now an absolute necessity. The motor vehicle is either a passenger car or a commercial car, and should be so styled. It is a far cry from pleasure to the real functions of a passenger car, and the associations of the two long since outlived should not be perpetuated.

littered up with unsightly and unsalable junk.

Dealers in Decatur, Ill., believe that the most effective method of convincing the owner of a used car of its actual value, is to induce him to attend an auction sale of this class. Finding it difficult to satisfy patrons who wish to purchase new cars and turn in their old, and who place an unreasonably high valuation on the latter, the Decatur dealers determined to get rid of all of the second hand cars on hand at a public sale, all to be sold regardless of the size of the bids.

The sale took place recently and demonstrated to the owners of old models just what their machines were actually worth when placed upon the market. It is freely conceded by the dealers throughout the country that they are the loser in the long run, because of too liberal allowances made on second cars in trades for new models, and some have reached the point where they will not take a used car in exchange on the sale of a new car.

Cars Put On Block

At the Decatur sale thirty-six cars were placed upon the block. There was a large crowd out and bidding was active, yet the average price realized was but \$163 each. Most of the sales ranged from \$107 to \$175. Many of them, although having the semblance of being serviceable, would more properly be classed as junk. A two-cylinder Buick truck, brought but \$45. A Waverly electric brougham, which had seen six years' service, brought but \$50. A 1908 Welch touring car, brought \$105. A 1916 Regal brought \$400 and a 1914 Paige, \$300. A 1913 Ford touring car brought \$175.

Every sale represented heavy loss for the dealer who entered it, but they believe that the standard of values demonstrated, will be helpful during the coming year in handling buyers who place an absurdly high price upon their old car. It also will be helpful in its lesson to those dealers who have been too generous in their allowances and who have been so eager to make the sale of a new car, that they outbid a rival who was more nearly correct in the valuation.

The Decatur dealers are discussing a proposition to open a clearing house for second hand cars where they can be stored and sold at a price to be fixed by a board of appraisers. A disinterested agent will be in charge who will be allowed a commission for each car sold. This plan has been found successful in Rockford and other places in the West and may soon be adopted in Decatur.

New Value Standard of Gasoline

Puts Volatility in Place of Gravity

WASHINGTON, D. C., Jan. 27—To-day witnessed the most unusual spectacle in the motor car industry—a large group of men in this city attempting to write the definition of gasoline. In this group were the greatest gasoline chemists in the country, the greatest government experts on the subject, leading motor car engineers, leading farm tractor engineers, and a host of others. They discussed for 12 solid hours, the subject of gasoline, and finally adjourned agreeing that it was impossible to write such a definition at the present time.

The meeting was called by the Bureau of Mines, and the Bureau of Standards, Departments of the Federal government, and all oil men were invited to attend. They responded generally, and this country has not seen such a determined and pertinent discussion on the gasoline question. **Legislative Definition Thought Injurious**

At one time it was thought necessary to have the Federal government pass a law applying to the District of Columbia, defining gasoline, with the object of having this law copied in the different states. The oil men to a man, went against any such legislation, backed up by the argument that any legislation specifically defining gasoline would prove injurious in that it would reduce the quantity of gasoline produced from a gallon of crude. The oil men stood strong for no legislation of this kind within a year, and the meeting adjourned with that conviction in mind.

To-day's meeting was called for sundry reasons. The price of gasoline has been going up sufficiently in the last year to warrant an investigation. A still greater difficulty has been the country-wide abuse in marketing gasoline. Sentiment was general to-day that unscrupulous dealers, buying a certain grade of some well-known market brand, mix it heavily with kerosene and often sell at a higher price. This, combined with short measure, led the Bureau of Standards to make a wide investigation some months ago with the results that short measure and mixing were found to be too general.

One of the big deductions from to-day's meeting is that gravity is no longer a criterion of gasoline value as a fuel, and that a new word will have to be taken up, namely, volatility. Oil men agreed with the government specialists that the term gravity, which has been used for years, has entirely outlived its value. From this date hence we will use the word "volatility," which is meant the ability of a fuel to change from the liquid to a gaseous state at certain temperatures. It was pointed

Experts Agree that Old Term Is No Longer a Criterion—New One More Clearly Defines Ability of Fuel to Change from Liquid to Gaseous State in Certain Temperatures

out by some of the oil men that a heavy fuel may be more volatile than a light one. Generally we assume that the heavier the fuel, or the lower the gravity as we have been accustomed to describing it, the harder it is to volatilize, but this argument was entirely disapproved from both sides.

This question of volatility instead of gravity, is bringing a new mathematical desideratum into the gasoline field, namely the volatilization curve. We are all familiar with the horsepower curve. We have become accustomed to charts and curves showing how food prices rise and fall over a period of years, or how the price of commodities vary, or how the grain production of the country goes up or down. To our stock in knowledge of curves we will now have to add the volatility curve, and when we stop for gasoline at the curb-side we will talk volatility rather than gravity.

Freedom of Speech Prominent

It was a wonderful meeting, wonderful for its freedom of speech, and wonderful for the frankness with which everyone discussed the extremely difficult problem. The ambition of the joint committee of the two bureaus is to take some action which will make it easier for the user of a car to be sure that when he asks for gasoline he will get a liquid which will run his engine in a satisfactory way. At the outset, it might seem to be easy to say where gasoline leaves off and kerosene begins. It might seem easy to formulate a definition of gasoline drawn wide enough to admit of hydrocarbons which will run a motor car satisfactorily.

After 12 hr. continual discussion between the oil men and the bureaus, it appears that a definition of gasoline is going to be almost impossible to make. The chief reason for this is that nobody, neither oil man nor motor car engineer, is at present able to say what gasoline ought or ought not to contain. There are just two things which are certain about it. Taking the engine of to-day, the fuel for it—1—must contain some proportion of highly volatile spirit, to allow it to be started. 2—It must not contain more than a very small proportion of spirit with less than a certain degree of volatility.

But practically nobody at the conference was able to place any definite mark on these limitations.

In order to understand the situation it is necessary to appreciate the meaning of a volatilization or distillation curve. In testing gasoline a small measured quantity is put in a flask and is boiled away, the vapor being condensed and led to a graduated measuring glass. In the neck of the flask is a thermometer and the accepted method is to observe the temperature at which successful proportions of the liquid have been boiled off. For example: The temperature may be read when 20 per cent has passed over into the condenser, again when 50 per cent is gone and again at 90 per cent. Finally, as the last drop in the flask vanishes, we reach the "dry point" or "end point" where the temperature again should be observed. The temperature when boiling first starts is known as the initial point. A pretty good gasoline in the ordinary sense of the term would be something as follows: 25 per cent boiling off before reaching temperature of 225 Fahr., 50 per cent boiling off before reaching a temperature of 265 Fahr., 90 per cent boiling off before reaching a temperature of 340 Fahr., dry point, 400 Fahr.

High Dry Point

Now there are very few gasolines on the market to-day with a dry point as low as 400; 450, which is well in the kerosene range, is quite usual. Dry points up to 500 are not uncommon. Furthermore, these high dry points can come in gasolines and be satisfactory in use. At present the engineers cannot say how high a dry point they are prepared to cope with. They cannot say how low an initial point they want. They cannot say whether they want a curve which runs up very quickly and then goes along pretty nearly parallel to the base line, or whether they want a curve ascending in a smooth slope from the initial to the final temperature. The oil men apparently cannot help them.

There is a very great deal to be said in favor of a definition of gasoline made by a specified distillation curve limits, for a fuel such that it will operate satisfactorily in a present-day engine. The engines of the future are going to burn almost anything in the way of liquid fuel.

It will be a very short time before the passenger car which will both start and run on kerosene, is at least as common as the gasoline engine. At that time what is to-day good gasoline will still be required to run the 3,000,000 cars now on our roads. The other machines, according to their degrees of ability, will be satisfied by 80 per cent, 60 per cent or 40 per cent gasoline mixtures. It would be quite easy to handle gasolines in this way just as alcohol is handled commercially. Nobody ever sees pure alcohol. It is always sold in mixtures with so much per cent alcohol and so much water. We can do just the same with gasoline. A motor car manufacturer could advertise his car to operate on say 50 per cent gasoline, and the chances are that if gasoline were defined to-day next year or the year after dealers would have in stock a little 100 per cent gasoline and a large quantity of 60 or 70 per cent. By this means it is argued the motorist would be able to know what he was buying.

Revise Definition Annually

Another recommendation is that a definition be established with a proviso that it be revised from year to year as occasion demands. The great cry of the oil men is that if any recommendation is placed on what is gasoline it will limit the amount of suitable motor fuel which can be produced from the wells. They also seemed to hold a general opinion that if a dealer has two grades or rather is selling at two prices, the majority of people will buy the dearer liquid. No positive evidence was produced in support of this somewhat extraordinary claim, yet it was again and again stated that a dealer who had gas at two prices sold most of the dearer quite without regard to the respective qualities. At the same time it was agreed that what the motorists want is the cheapest possible fuel which will run his car. This was stated over and over again and flatly contradicts the other statement. It would seem likely the truth is the average man is anxious to get the cheapest fuel possible and believes that by paying a higher price he will get something which will make starting easier.

The big difficulty with gasoline is the large number of opportunities for adulteration which occur between the refining process and the time when the liquid goes into the tanks of the motor car. From the refiner the gasoline goes to the jobber who buys from different sources and probably mixes different sorts by dumping different carloads in the same main tank. The jobber has the opportunity of adding to the gasoline something which he buys under a different name, such as kerosene or distillate. He may do this and yet produce a perfectly satisfactory fuel. There are gasolines on the market to be bought at the refineries which are actually improved by the addition of kerosene.

From the jobber the gas goes to the tank wagon and a dishonest teamster has ample

opportunity for adulterating the liquid it is his duty to deliver to the retailer. Six drivers in Detroit were recently caught making a fifty-fifty mixture of the jobber's gasoline and kerosene before delivering to the retailer. Finally, the retailer can again blend or mix just as the jobber can.

Here comes a very crucial point. If the refiner supplies Blue Moon gasoline, the jobber who handles this or the retailer or anyone else who adds anything to it is guilty of fraud, if from refinery to private motorist, the product is sold as Blue Moon gasoline all along the line. If, however, either jobber or retailer buys Blue Moon gasoline, mixes something with it and sells it as Pink Sun gasoline he is not guilty of any fraud whatsoever.

It was reported to the bureaus by many of the speakers that a regular habit among a certain class of dealer is to buy a proprietary brand of gasoline and sell it at the marked figure, say 18 cents, under its own name. They will take some of this, debase it by kerosene additions and sell it under some fancy name of their own at a cent or two a gallon more and the motorists buy the dearer product under the impression that it must be better. This, of course, is plain dishonesty, yet it is a kind of dishonesty which few laws exist to stop. That it must be stopped somehow or other is obvious. Just how to stop it is at the present moment up to the Bureau of Mines and the Bureau of Standards, but from their two-day session with the oil men and other interested parties they obtained very few concrete suggestions.

Adulteration of Gasoline

From all over the country comes the cry that gasoline is being adulterated, that what is being sold now makes starting very difficult and provokes rapid carbonization. Throughout the country legislatures, both state and municipal, are drafting bills to regulate the sale of gasoline. In a number of districts there are already laws in existence. Nearly all these legislatures are appealing to Washington for guidance, are appealing to the Bureau of Mines and the Bureau of Standards to give them a rational basis for a law which will protect

motorists from fraud, which will insure that when a man buys gasoline he gets what he wants, even although he is incapable of describing in scientific detail just what it is that he does want.

At the same meeting were representatives of states and cities, who, with one accord, declared that whatever Washington might decide to do, in their respective districts there would be laws.

To this the response of the oil men is, if there must be laws let them be uniform laws and let the aim of legislation be not the definition or specification of gasoline, but let it be something to prevent the sale as gasoline something which is not gasoline, as the term is ordinarily understood in commercial circles at the moment. The oil men will all support a legislation which will allow the refiner to sell gasoline of any specification and will insure that the retailer delivers to his customers that self-same liquid.

They will oppose a law which places any limitation upon what the refineries may sell in bulk as gasoline.

This sounds a very unjust thing, but it is in truth by no means what it sounds. In the last few years gasoline has grown steadily less and less volatile, and this decrease in volatility will continue in all probability through future years. This gives us an alternative.

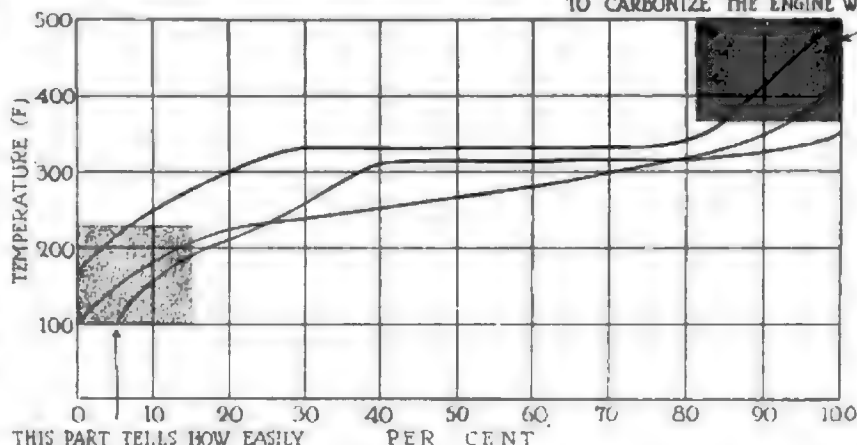
1—We may make a definition for gasoline with sufficiently wide limits to cover all the satisfactory kinds on the market to-day. If this is done the chances are, in a year or in two years' time, 100 per cent gasoline, according to that specification, will not be obtainable.

2—We may legislate to enforce the sale by the retailer of what the refiner likes to call gasoline. This means that from year to year the volatility of gasoline would decrease, but its average composition throughout the country probably would be fairly even on any given date.

As a method for starting the meeting and obtaining a basis for discussion, the joint committee of the Bureau of Mines and of Standards suggested three possible

(Continued on Page 25)

THIS PART TELLS HOW PRONE TO CARBONIZE THE ENGINE WILL BE



THIS PART TELLS HOW EASILY THE ENGINE WILL START

Curve showing difference in effect of high and low grade fuel on engine

"MOTOR AGE offers no apology to its readers for the following pages on the question of our foreign trade as presented at the annual convention of the Foreign Trade Council in Pittsburgh last week. In these days, when preparedness is on every tongue and every patriotic citizen is looking to the days following the signing of peace, it is high time that all citizens, whether in the motor car industry or not, familiarize themselves with questions of government relating to this question.

"The mere reason that we are not manufacturers and that we are not in anywise connected with foreign trade is no reason why we should slight it. It is the big, pertinent question of the day. It will be a still more important question in the days following the signing of peace.

"Too few of us realize that foreign trade is part and parcel of our political system. Today the three big factors handicapping our foreign trade are political questions, and, being such, each voter has a say in the solution of them.

"These questions are: A merchant marine or some reconstruction of our shipping policy; some legalization of co-operation in selling our articles abroad and which is not permitted now because of the Sherman act; and, lastly, a bargaining tariff which will enable our government promptly to meet any increase in import duties by any of the belligerents or European neutrals.

"Motor Age is convinced that these questions are sufficiently pertinent to lay before its readers, and invites most careful consideration of them as well as the most active support in their behalf."

The Three Essentials

By David Beecroft

PITTSBURGH, Jan. 27.—That American manufacturers in all lines of industry are extraordinarily interested in export trade and are also interested in what foreign trade conditions the United States is going to face when the war closes was demonstrated at the annual convention of the Foreign Trade Council, a government and business organization, at its fourth annual convention held in this city for the past three days. Over 1250 delegates from all of the states of the Union attended. A special train brought over 150 delegates from the Pacific coast, and a contingent of over fifty came from Texas. Nearly all of the delegates were manufacturers in all lines who were anxious to learn about foreign trade, anxious to learn how to build up foreign trade, and anxious to learn as to what kind of trade competition we will face after peace.

The Foreign Trade Council was organized several years ago to be a common meeting ground for business men and government officials. Its aim was to bring business men and government closer together. That this work has been done under the direction of Edwin N. Hurley, who has been chairman of it for several years was best

attested to by the 1250 delegates as compared with less than 400 delegates at the convention in New Orleans just about a year ago.

The motor car industry was not so well represented as it should have been. Perhaps a dozen car companies and a score of accessory concerns had their export managers present. The convention deserved twice as large representation.

After 3 days of speech making, reading of special addresses, discussions and banquets the convention voted unanimously that three broad achievements have to be scored before it will be as easy for our business men to carry on export trade as it has been for many firms in European countries.

1

FIRST: It will be necessary to have more ocean-going ships to carry our trade to foreign shores; in short, we must have a merchant marine. At present our goods are being carried too much in foreign ships. It was brought out in discussion that only one Amer-

ican boat has cleared from the Port of Galveston, Tex., in two years in foreign trade. The foreign trade of that port has largely been handled by the Japanese. To show to what extent our foreign shipping in American boats has suffered of late, Capt. Robert Dollar of the Robert Dollar Co., San Francisco, told how before the war our ships had carried 26.10 per cent of the total tonnage on the Pacific ocean, but that today our ships are carrying only 1.97 per cent of the Pacific ocean tonnage. On the other hand Japan before the war was carrying in her ships 26.05 per cent and today is carrying 50.90 or slightly more than one-half of the total Pacific tonnage. While Japan has doubled we have been cut practically to nothing.

In spite of being at war Great Britain has increased her shipping in the Pacific. Before the war she carried 29.38 per cent of the total Pacific tonnage and today is carrying 37.00 per cent of it.

Our loss in ocean tonnage is laid to legislation which has been generally interpreted as being more favorable to foreign ships than to our home ones.

2

SECOND: It will be necessary for U. S. A. manufacturers to be permitted in some manner or other to co-operate in selling our exports in foreign fields. It transpires that co-operation has been one of the big reasons for rapid pushing of foreign trade. Germany, in particular, has permitted and encouraged all forms of co-operative effort among her manufacturers and merchants. At present co-operation among our manufacturers for foreign trade comes under the regime of the Sherman act, and it is not certain whether the government could not proceed against a combination of three or four concerns that banded together for export. What we need then is some legalized method of co-operation in the foreign field, and for this purpose the present Webb bill is before the Senate. It has been up for consideration in Washington for three years.

It has already passed the House of Representatives, and it is hoped to

put it through the Senate before March 4. Its adherents are working hard for it and no doubt will be victorious.

The Webb bill aims at the simple goal of permitting any number of makers to work together in their export trade. They may unite and have one man handle their various lines in foreign lands. They may form some corporation for export trade only. The reason for this necessary co-operation lies in the fact that it is too expensive for many small manufacturers to carry on their own export work; too expensive to send their own salesmen to different foreign countries. European countries have for years worked in this co-operative way.

Such countries as Germany in particular and England also, have organized large selling firms in foreign lands who handle hundreds of different lines. Thus we find both English and German department stores in different lands, these being organized primarily as good methods for introducing and selling the merchandise of the respective

3

THIRD: The convention decided that a third broad essential to foreign trade is that the U. S. A. secure certain tariff changes. At present we are working under a low schedule of import duties and have not the power to raise the schedule, but have the power to lower it. After the war the entire tariff fabric of Europe will be changed, in fact, is being changed today, and in order to compete with European countries it will be necessary for us to have what is known as a bargaining tariff with power vested in the president to raise tariff schedules with different countries as necessary. At present our tariff is barren of any possible bargaining ideas.

With these three major considerations accomplished the 1250 delegates voted that it would be much easier for our motor car makers, accessory makers, truck makers and all manufacturers to progress in foreign trade.

The New Europe

THE convention brought out some very pertinent facts with regard to our present position with European countries, particularly those engaged in the war. In this respect the generally accepted condition of Europe when peace is signed was that it will be a new Europe, a Europe of efficiency, a robust Europe, a Europe trained to act in concert, and not a war-crippled, maimed and worn-out Europe. Europe has progressed more in the last thirty months in great lessons of co-operation and efficiency than she did in the previous thirty years. This opinion was generally shared by all delegates present. Trade commissions recently returned from France and England have told of the new Europe.

Europe after the war, or the new Europe, the co-ordinated Europe, the efficiency Europe came in for general comment at a score of different times during the convention so the unanimous consensus of opinion is that all Europe will emerge from the war as a young athlete after his weeks of hard training for the final football game or for the annual athletic meet. It will be no weakened Europe, but a Europe filled with men hardened by months of physical training and outdoor life, and a Europe breathing through every pore the lesson of co-operation.

Louis E. Pierson, chairman of the Irving National Bank of New York city, speaking on American banking and foreign trade sees Europe after the war stronger

financially and better equipped for world trade than before the war. Here is how Mr. Pierson puts it:

"Europe of the future will hold no less powerful influence in the world of finance than did Europe of the past. We dwell too much on the idea of a war-devastated, war-scarred, helpless Europe, and we have been unable to see the other Europe, the Europe of aggressiveness and power, which after the war, will face the world, a better customer, and a more dangerous competitor than ever before."

Comparing the United States with the various countries of Europe, Mr. Pierson called attention to the very general co-operation between the government and business in nearly every country, whereas such co-operation has been hopelessly lacking in our country. He said:

"In nearly all Europe throughout every complexion of government, all the way from socialistic Denmark, through the various republics to intensively bureaucratic Prussia, there has been evolved a

uniform, well-defined, nationally accepted theory, controlling all the essential relations between government and business. The importance of the result hardly can be exaggerated. Every resource seems to have been fashioned into a common national weapon, to be employed in the interest of either business or government."

Contrasting our government with European governments in this respect, Mr. Pierson continued:

"In the United States the situation is almost entirely otherwise; business is disposed to view government as a more or less respectable policeman, and government is disposed to view business as a more or less dangerous malefactor. Each appears willing to concede to the other the possibility of merit, but neither appears willing to concede sufficiently to make it possible for both to get together upon the perfectly obvious theory that their interests are identical."

The question of conditions in Europe after the war was handled by W. W. Nichols, who was chairman of the American Industrial Commission to France, which spent forty-five days last fall studying the field of destruction in France and looking into the question of which reconstruction work will have to be done in France and Belgium when the war is over.

Mr. Nichols told of the zone of destruction which in France alone includes 750 towns, and in addition four cities of over 100,000 population each. But great

It must not be inferred that it is impossible for any U. S. A. merchant to build up foreign trade under present conditions, far from it; but it is conceded that our merchants are not working on an equal footing with foreign merchants because of the three handicaps referred to.

as the work of reconstruction may be in the war zone, Mr. Nichols believes that it will be exceeded by the work of reconstruction through all of France. He told of how the Touring Club of France, a motoring organization for the distribution of touring information, in co-operation with the hotel associations and other organizations, plans to spend \$100,000,000 in the general rehabilitation of the resort hotel system; he told of plans that will call for 17,000 farm tractors such as our tractor makers are now producing for farm work; he told of the need of 125,000 farm plows, many of which will be used with gasoline tractors; he told of the enormous demand for other farm implements, not specifically mentioning motor trucks; he told how \$75,000,000 to \$100,000,000 will be needed in new textile machinery; he estimated that \$600,000,000 will be needed for the replacement of industrial property in the war zone alone.

Long-Time Credits

Mr. Nichols believes that after the war France will require long-time credits, but he believes that caring for these credits is rather a question to be handled by our bankers than by our manufacturers. He feels that there is no danger of financial losses connected with such long-time credits because the French national character is founded on an innate repugnance to bankruptcy. Bankruptcy is considered a disgrace in France, and so there are few dangers connected with credit extension to that country.

It was voiced by C. H. McIntosh, vice-president of the Bank of California, San Francisco, that we should not be misled by the fact that so much gold has come to us since the war. Mr. McIntosh claims that it is not to our advantage to drain gold from other countries to our coffers; and that our interests in the soundness of financial conditions abroad are second only to our interests in the soundness of financial conditions at home. Mr. McIntosh charged us with being too selfish in our foreign trade, and of lacking a national comprehension of the questions of foreign trade and how to solve them. We have as individual firms traveled too much on our individual roads and have forgotten the broad road of common travel so pursued by many foreign nations. We must cultivate a broader view of foreign trade and learn to think of the whole rather than the parts. We should learn that in foreign trade our individual interests are advanced by team work, just as in a base ball or football game.

Mr. Pierson touched on one of the biggest questions in connection with finance and foreign trade when he took up the problem of the huge loans which we have made to belligerents. The value of these foreign loans is great. These loans are really the guaranty of credit to the belligerents to enable them to buy from us and pay for, under reasonable conditions,

the products we have to sell. All European countries will meet all of these obligations. There is not a symptom of doubt as to this. The Europe of the future will wield no less powerful influence in world finance than did Europe of the past. The financial center of the world has not been moved across the Atlantic because of these loans and the war. Mr. Pierson continued on this subject:

"The new Europe of the future, viewed as the basis of foreign loans, is entirely sound. In both disposition and ability its position as a foreign debtor may be built upon with safety. It will pay its foreign debts, protect its foreign credits, redeem its foreign pledges, and for the best reason in the world, self interest. Its credits must not be impaired. Countries like France and England, whose financial power has been built upon a world commerce, and which even during the stress of war are able to maintain the most profitable world trade in their history, will not find it necessary or desirable to face the world after the war upon any other than a sound financial basis.

"With such a background as this is it probable that the new Europe will allow us to adjust the world finance of the future to suit our purely domestic whims and without proper reference to the rest of the world?

"We speak of controlling the finances and commerce of the world. What manner of assurances have we on this point? Our \$2,750,000,000 of gold reserve insures for us no such position, unless each dollar of it makes to the world its own particular commercial argument in the form of an offer of credit upon which a mutually profitable business may be based.

"Europe and the world buy from us now because they must, and pay us in gold because they must. After the war they will continue to buy from us in such quantities and for such time as may be in harmony with their own interest and convenience. The controlling interest will be self-interest and not sentiment.

"If we are to become the great creditor nation of the world, as we occasionally assert, we must in our attitude to the rest of the world express the quality of broadness and of liberality. The European war has conferred on us no advantage which we cannot easily lose, only our best efforts will enable us to retain even our present position."

The views of Messrs. Pierson, McIntosh and others on the huge loans to European belligerents were shared by Festus J. Wade, president of the Mercantile Trust Co., St. Louis, Mo., who in drawing comparisons between the present war and our civil war lasting 4 years, showed that in the civil war the cost to us was 18 per cent of our entire wealth, whereas in Europe today the war has not cost some of the belligerents in foreign loans three quarters of 1 per cent of their present wealth.

"To develop foreign trade we must develop credit and we must not fear that the nations may not meet their obligations. It cannot be possible that they will fail to meet these loans.

"Nationally we appear to lack ordinary comprehension. We slumber along peacefully, secure in the business of the past and in the comforts of the present, while our competitors are up and doing.

"Why even during the period of war, Europe with its war losses and disturbances, has already outdistanced us in progress towards preparation for the financial and commercial struggle to follow.

"England, in spite of her traditional conservatism, is preparing to build in the foreign financial field on a scale the magnitude of which almost takes one's breath away, and in doing this is only following a theory which, for years, has been of common acceptance in foreign countries.

Germany Fostering Financial Power

"Germany, in spite of enforced isolation from commercial world activities, is fostering in the foreign field every existing element of the financial power she once possessed.

"Italy, France and Switzerland are sparing no effort to extend and more fully develop their already extensive foreign financial establishments.

"Even Japan has broken away from her ancient traditions and now appears in the financial centers of the world as a power to be reckoned with.

"At the same time we, in the United States, instead of reading these signs of danger, appear quite well satisfied with a fairly comfortable present foreign success which furnishes no reasonable assurance for the future."

Mr. Pierson ended with a scathing criticism of our people in which he bluntly accused us of not being able to get together, in spite of our generally proud thought of being called the United States of North America. Here is how he put it:

"Our weaknesses clearly belong to a nation whose people and institutions have not yet acquired the art of getting together; unorganization, the lack of co-ordination of effort, a powerful machine fully efficient in domestic things but not yet properly adjusted to the more highly complicated requirements of a world situation."

In addition to the prevailing consensus of opinion that Europe will not be crippled in a manufacturing sense after the war and that she will be very aggressive in her foreign trade, Mr. Pierson contends that financially Europe will not be weak, in spite of the enormous war costs, and in spite of the enormous sums that will be expended in reconstruction work.

WASHINGTON CITIES MUST PAY TAX

Tacoma, Wash., Jan. 26—Under a ruling of the supreme court, which reversed the action of the Pierce County courts, the city of Tacoma and other Washington

cities will be compelled to pay the annual license on all of its motor cars. The municipality has about ten machines. The ruling also hits the county. Police and fire department cars alone are held exempt. The superior court held that a motor vehicle license constitutes a property tax and, under the law, the court held all municipalities are exempt from general property taxation.

The supreme court holds that "this is an untenable theory" and rules the payment of a motor vehicle license is not the levying of a property tax, but is merely a license or privilege tax, which cities must pay as well as private individuals.

PLANS RECIPROCAL LAWS

Boston, Mass., Jan. 26—Plans are now being considered for a reciprocal system to inaugurate uniform laws throughout New England, and later spread the gospel to other sections of the country. The Bay State A. A. took the matter up at its annual meeting.

It was pointed out that as the federal government has now decided that the various states may pass whatever laws they see fit to govern motorists it is evident that a good plan would be to start some sort of a reciprocal movement in New England. This is a small area and a tourist can visit all six states in a day, yet for Massachusetts motorists New Hampshire and Rhode Island have barriers, allowing only ten days sojourn in any one year. Then, too, there are barriers against motorists in those states. The situation is believed neither just or fair.

HAYDEN OUT OF PULLMAN

Chicago, Jan. 30—H. W. Hayden, vice-president and general manager of the Pullman Motor Car Co., York, Pa., is no longer connected with this organization. A. R. Cosgrove, sales manager, has charge of the purchasing department, formerly handled by Mr. Hayden. Mr. Hayden's future plans have not yet been made public, and he still retains his stock in the Pullman company.

TRUCK OWNERS TALK FENDERS

Chicago, Jan. 30—Probably the most vigorous protest against Chicago's truck fender ordinance will be lodged Thursday with the chief of police, in answer to his call for a meeting of the truck owners of Chicago to determine how long it will be before they can equip their trucks with the fenders, demanded by the present ordinance. It is expected that 300 representatives of the commercial vehicle users in the city will be present, to show the impracticability of the fenders called for.

MAY EXTEND BANKHEAD ROAD

Atlanta, Ga., Jan. 26—Extension of the Bankhead highway until it becomes a transcontinental highway stretching across the continent from Washington to Los Angeles and through the southern and southeastern states, is the latest develop-

ment in connection with the perfection of this great roadway.

The road was at first intended to reach from Memphis to Atlanta by way of Birmingham and for some weeks representative organizations of these states have been hard at work perfecting their plans for the road, but, according to Secretary Fred Houser and President Frederick J. Paxon, of the Atlanta Convention bureau, the actual organization for the transcontinental extension will begin in Atlanta within the next sixty days.

Mr. Paxon is in receipt of a letter from officials of the highway declaring that since its organization hundreds of requests have come from western states begging that the organization extend the work from Washington to Los Angeles in addition to the original route.

JOLIET WHEEL TAX APPROVED

Joliet, Ill., Jan. 27.—The new and revised ordinance providing for a wheel tax has met with the approval of most of the objectors to the first measure adopted and which was finally withdrawn by the coun-

cil. The fees as reduced, meet with the approval of those residing in Joliet, the only complaint recorded being one applying to the failure to assess those who use the streets for commercial purposes, yet who have locations outside of the corporate limits. Mayor Barber believes that outsiders can be reached by means of an occupational tax, through a wide tire ordinance and other measures. He is convinced that if the outsiders who use the Joliet streets for gainful purposes were compelled to pay a special tax, either under the guise of an occupational tax or some other form, the opposition inside the city would disappear.

WHITE HEADS U. S. L. SALES

Chicago, Jan. 30—John A. White, who has been connected with the U. S. L. Lighting and Heating Co. for the last eight years, has been promoted from manager of the Chicago office to sales manager and will assume his new duties at once. He will be located at the home office at Niagara Falls, N. Y. His successor as manager of the Chicago office has not yet been announced.

Volatility vs. Gravity

(Concluded from page 21)

schemes for consideration, and these were:

A—That no action of any kind should be taken by the Federal government.

B—That one or more standard specifications for gasolines be adopted and it be required that all motor fuels sold in interstate commerce under the name of gasoline shall be sold under the designation of one of these established specifications.

C—That no standard specifications be adopted, but that all gasolines or motor fuels should be labeled in some way which would indicate the nature of their distillation curve. As, for example: A fuel labeled 100-200 might mean that at least 20 per cent would distill over below 100 deg. C. and at least 90 per cent below 200 deg. C.

Conclusions

The conclusions of the meeting, although no motions were taken since the gathering was a hearing and not a conference, were briefly as follows:

1—Do not recommend any legislation for at least one year, and devote that year to finding out what gasoline ought to be to satisfy the public and the engineer.

2—Examine every possibility of preventing dishonest adulteration and the charging of high retail price for a blend having a low wholesale price.

3—That it would be a good thing to establish a permanent committee with representatives of the bureaus concerned, the refiners and the motor car industry.

Although no official announcement has been made there seems little doubt in the minds of the representatives of the bureaus that some such committee will be formed and that the bureaus in conjunction with

the motor car industry and the oil men will make a big effort to discover what characteristics motor fuel should possess for the engine of to-day.

The meeting, as already stated, was very well attended and it would take a column or more to give the names of all the important people present. To give just a few as showing the character of the meeting, there may be mentioned Dr. W. M. Burton of the Standard Oil Co. of Indiana; C. D. Chamberlain, secretary National Petroleum Assn.; Dr. F. C. Robinson, chief chemist Atlantic Refining Co.; R. L. Welch, secretary Western Oil Jobbers' Assn.; Guy Stevens, chief attorney the Texas Co.; J. C. McCabe, head of the department of safety engineering of the City of Detroit; Otto H. Klein, Board of Estimate and Apportionment, New York. The Society of Automotive Engineers was represented by A. Ludlow Clayden, ex-chairman of the Standards Committee and H. L. Horning, member of council. Representatives of many other individual oil companies and of several states and cities were also there, and it was very noticeable that the oil companies usually had two or more men representing the legal side and the technical side.

The meeting was wonderfully handled by Dr. C. W. Waidner of the Bureau of Standards. In passing a most hearty vote of thanks to the bureau, it was remarked that Dr. Waidner and his associates had throughout the 12 hrs. exhibited no prejudice, but had taken up the points, asked questions and argued details for the sole purpose of extracting the maximum of information.

Pick-ups from the Accessory Exhibits

New Lamps, an Electric Valve Grinder and a Can Tipper for Labor Saving

CHICAGO shows are not prolific in new accessories, nevertheless there always is a number of devices—mostly of Western origin—which have not found their way East and did not appear in the New York exposition. On these pages some of these are described as well as others which were shown at New York.

Oakes Products

The Oakes crank lock for use on Ford cars combines a license holder, crank holder and car lock. The price of the complete equipment is \$1. It consists of a main metal bracket readily attached to the car by the two front-spring support bolts. This bracket is forked over the starting crank and above this two arms are pivoted which may be raised out of the way or dropped over the crank lever, holding it rigidly in place. On the end of these two arms are holes through which the padlock is inserted when one desires to lock up.

Another is Oakes Beartone fan horn for Fords. The new price on this instrument is \$3.50, a reduction of \$1.50 from the previous selling price. The instrument consists of an assembly mounted in place of the regular fan. Within the fan blades is a horn consisting of the customary steel ratchet and a thin steel diaphragm that vibrates to produce the warning signal.

One of the features of this horn is that the volume of tone can be controlled by the operating lever. The Oakes Co., Indianapolis, Ind.

Sexton's Castor Motor Oil

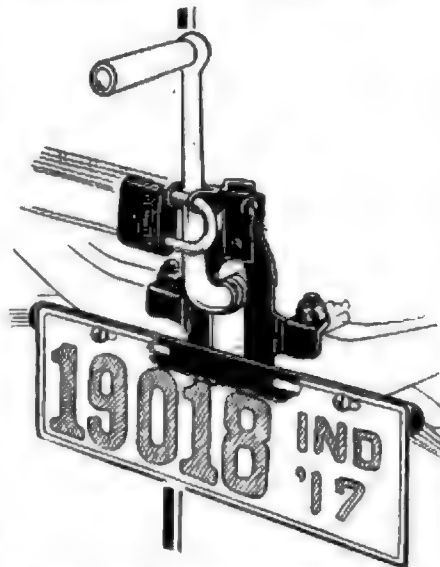
This is a patented lubricant containing pure vegetable castor oil combined with high grades of mineral and other vegetable oils. It is said to give all the advantages of pure castor oil at a fraction of its cost. By regulation of the amount of castor used there are grades of Sexton oil for every type of motor, and the company offers a booklet recommending grades of oil for every make of car. Sexton Oil Co., Chicago.

Dixon's Graphite

This lubricant is composed for use in the engine, gearset, differential, timing gears, universals, pump cups, overhead-valve cups, thrust collars, wheels, spindles, chains, springs, etc. It is made up in a variety of grades to meet the uses described above, and the consistencies include a pure flake compound or mixtures of graphite and high grade non-flowing oils. Joseph Dixon Crucible Co., Jersey City, N. J.

Jackson Electric Valve Grinder

This is a compact portable, motor-driven tool said to be capable of grinding



The Oakes cranklock, a combination of car lock, crank support and license bracket

valves perfectly in a fraction of the time usually required. In operation the oscillating motion employed in hand grinding is followed at 400 to 750 oscillations per minute imparted to the valve. A flexible, cushioned contact is provided between the valve and the grinder mechanism which admits of a light, medium or heavy pressure upon the valve for accurate work. There are two sizes, one for garages, which takes valves up to 2¼-in. diameter, and one for continuous heavy duty manufacturing purposes capable of grinding valves up to 4-in. diameter. The grinders are shipped complete with flexible cable, connector, plug, hand controlled switch, and slotted and spanner valve bits. The Kalamazoo Railway Supply Co., Kalamazoo, Mich. The Chicago exhibit is conducted by Wales-Adamson Co., 1402 S. Michigan Avenue.

Two New Solar Products

Solar has a new windshield spotlight with an adjustable mirror, a switch on the lamp, an outside focusing device, and a universal frictional adjustment. The bracket permits turning of the lamp in any direction without need of thumb-screw adjustment. The screw focusing device is operated by a knurled nut from the outside of the lamp. The price in black and nickel with mirror is \$7.50, and without mirror is \$6.75. Finished all nickel the prices are \$10 and \$9.25. The other new offering is the Duplex headlight. This is really two lamps in one. The steel shell is built with a large oval for the large lamp and a small oval for the city driving lamp,

the assembly combining the two lamps into one unit. The large reflector opening is 9½ in., and is fitted with an 18 c.p. bulb, while the small reflector opening is 3½ in., and is fitted with a star lens, and a 12 c.p. bulb. The price is \$20. C. M. Hall Lamp Co., successors to the Badger Brass Mfg. Co., Kenosha, Wis.

Curtis Tire Filling Station

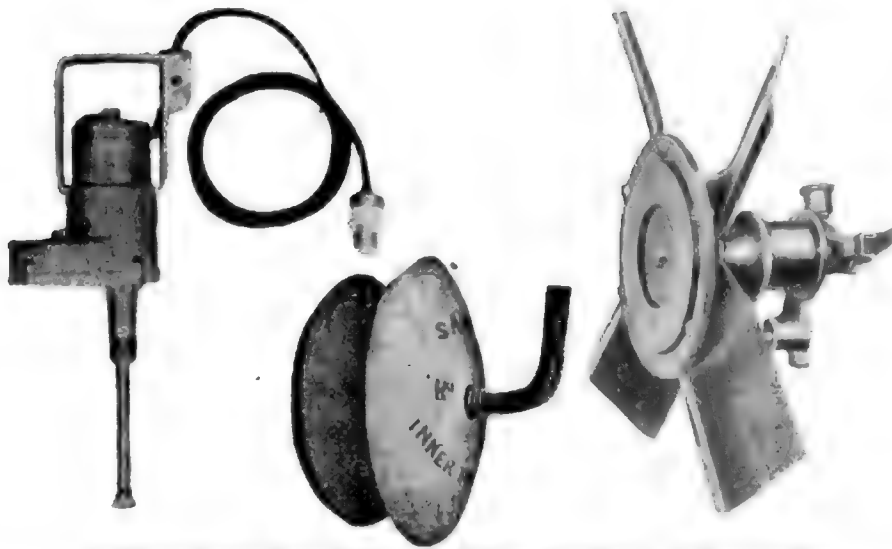
With the Curtis correct pressure tire filling station, you turn the dial to the size of the tire you intend to fill, and you get the correct pressure in the tire regardless of the pressure carried in the storage tank. The filling station is a neat pillar device for installation on the curb or other convenient place, and this is dependent on a pump and pressure tank located under cover. The station is enameled in an attractive Parisian yellow color, making it a great attention getter. The base is a locker compartment in which the hose is stored under lock and key. The price includes free-air sign, a 25 watt tungsten lamp within a canteen shaped transparent free-air light sign on top, a 33-watt carbon lamp inside of the gauge case for illumination of the dial and gauges, 30 ft. of oil-proof air hose and an automatic tire chuck. Price is \$135. Curtis Pneumatic Machinery Co., St. Louis, Mo.

Gargoyle Mobiloids

There are six grades of Gargoyle Motor oils. The grade A is one of medium body, the grade B of heavy body, the grade BB of medium heavy body, the grade E of light body, and the Arctic. The manufacturers have prepared a table in which is included practically every automobile manufactured, recommending one of those grades for use in the various models from 1913 to 1917. There is a grade D for Stanley cars and steam tractors, a grade C for gearset and differential lubrication, and a grade CC for gear lubricant. The line also includes hard greases, and four grades of Zeta engine oils produced to meet the demand for intermediate priced lubricants. Vacuum Oil Co., Rochester, N. Y.

Burg Cotterpin Puller

The handle on this cotterpin puller slides along the shank in a manner that permits of the pin to be removed by impact after hooking into the eye of the cotterpin. The tool consists of a short steel rod about ¼-in. in diameter, having a small hook at one end and a sliding handle headed at the opposite end. It is said that this puller will remove practically any sized pin in use in the car, and is also useful in spreading cotterpins when replacing them. It is made in two styles, black finish \$1, nickel



The Jackson electric valve grinder, the Sampson patch and the Beartone horn

point where it will close instantly and without loss of air pressure, and all ordinary tread punctures, so it is claimed. Bonner Sales Corp., Chicago.

Hayes Wire Wheels

Although Hayes wheels have been produced only a year, the factory is already turning out 500 a day. The feature of this wheel is the ease with which it may be removed. Although there is no load carried on the hub cap, it is only necessary to remove it in order to release the lock which holds the wheel to its hub. The shell of the wheel hub contains six depressions into which lugs from the inner hub fit, thus locking the two hubs together effectively. Hayes Wheel Co., Jackson, Mich.

Easyon Chains

Easyon chains are single chains fastened to the spokes with leather covered fasteners which do not injure the paint. The gripping member is made of steel over $\frac{1}{4}$ in. thick, rounded and perfectly smooth where it comes next to the tire, but having the thin edges projecting away from the tire so that they take a powerful hold in mud, snow or ice. Easyon chains are packed in a set of eight in a bag; four for each rear wheel. They sell for \$3 to \$5 per set, depending on the tire size. Woodworth Mfg. Corp., successors to Leather Tire Goods Co., Niagara Falls, N. Y.

West Cast-Steel Wheels

The West Cast-Steel wheel for 3-ton trucks weighs but 175 lb. The wheel of wooden construction weighs nearly twice this amount. This is an example of the light weight obtained by a scientific layout of the spokes and ribbing in this cast-steel wheel. The hubless type is now and is made for pressed-on and demountable types of tires.

This wheel is machined to fit in the hub and flange. There are already 35,000 of the standard hub type in use and it is claimed that there has not been a single failure. In this the hub is cast integral

with the wheel. The West Steel Casting Co., Cleveland, O.

K-W Road Smoothers

Springs and air pressure are used in the K-W road smoothers to eliminate shocks when applied to Ford cars. They are supported between the axle flange and the leaf spring. The plunger housing is fastened to the axle flange, and the connecting rod from the piston is fastened to an anti-side motion link which is in turn supported to the leaf spring. The main shock is taken care of by the helical spring operating between the piston and the bottom of the cylinder, and this piston is made tight with an automatic lubricating pad, and above it is an air chamber to take care of rebound. The price per set of four K-W Road Smoothers is \$15. K-W Ignition Co., Cleveland, O.

New Kemco Starter for Fords

The new model Kemco differs from preceding models chiefly in the fact that the starting motor is now located under the hood, whereas it formerly projected in front of the radiator. The starting motor is chain driven from the front of the crankshaft, and the generator takes the place of the fan, and carries four fan blades in its outside surface. The weight of this generator is 13 lbs., and it is driven direct from the crankshaft over a 5-in.

pulley by a V-belt. The price is \$100 complete. Kemco Electric Mfg. Co., Cleveland, O.

Motor Eye

The Motor-Eye is a thermometer operating under water within the radiator and registering in a disk placed on the top of the filler cap. It registers the motor temperature accurately at all times, thus giving the driver a check on the efficient or inefficient operation of his motor. It is made up in a variety of types for use on the different makes of cars, and in the standard type with a round dial sells for \$5. Metalware Corp., Chicago.

Sampson Puncture Plugs

To insert a Sampson featheredge puncture plug, one punches a hole around the puncture with the special pliers, spreads the hole with these pliers, inserts the plug, tightens the plug by turning the screw wire, breaks off the wire, and the job is finished. The 50c outfit consists of pliers and three different sizes of plugs. Extra plugs cost \$1.75 per dozen. Stevens & Co., New York.

Wonder Worker Specialties

Included in the line of Wonder Worker specialties is a Never-Freeze compound for radiators which will not boil over or evaporate, it is claimed. One application is sufficient for a season, as the compound remains in the radiator, and it is only necessary to replenish with water as required. A gallon can sells for \$1.25. Other products are compounds for renewing tops, brightening horns and lamps, engine enamel, body varnish, patches, tire cement, gasket cement, rim shellac, valve grinding compounds, carbon remover, soap, and a variety of other useful products. Gray-Heath Co., Chicago.

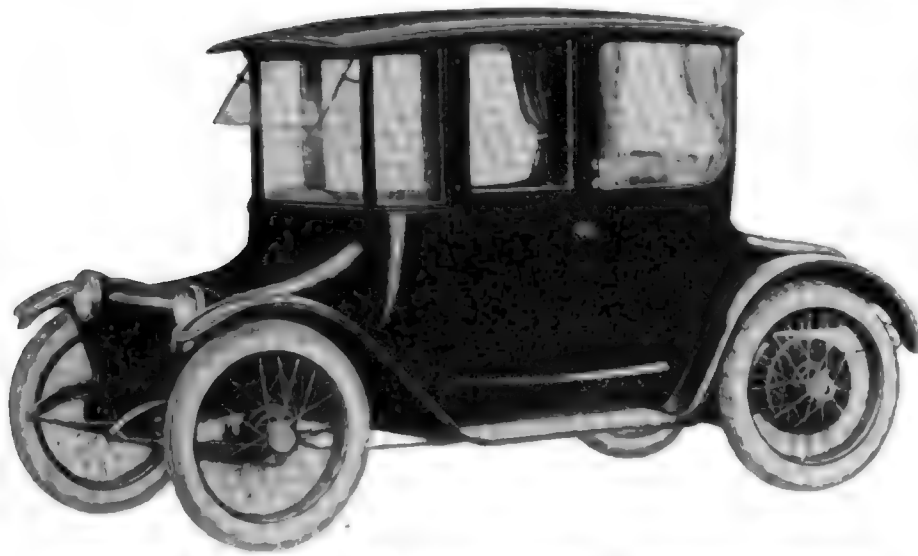
New Halladay Products

The newest thing in Halladay accessories is the can tipper. This is an all-steel standard which holds all 5-gal. cans, either square or round. The can is placed in the tipper, and when it is desired to pour from the can it may be tilted forward with practically no muscular effort. It prevents the spilling of oil and avoids the lifting of 35 lb. or so of weight. The Halladay suitcase or package carrier is a simple clamping device for attachment to the running-



the Halladay can tipper and the new The Halladay suit case and parcel carrier, universal clamp terminal found on Detroit batteries

The Electric at the Show



Greater efficiency in production has given to the public this Detroit model 68 at \$1,775

COLISEUM, Chicago, Jan. 27—Chicago with its level stretches and smooth boulevards invites the use of the electric more often than do its sister cities who have to put up with hills of more or less exacting grades. For this reason the electric cars on exhibit at the motor show this week are attracting a great deal of attention. Five makes are represented at the Armory. One of the five is the Woods Dual Power, but it is not other than fair to include it, since it can be driven as an electric as well as a gasoline car or both. **A Model at \$1,685**

That the electric is more than ever apt to be a family car is evident in the models on display. Refinements of structure and efficiency of production have made feasible a lighter car requiring less current to run it and a price within much easier reach of the average pocketbook. The effect of the price on the sale of the electric long has been evident, and the nature of the car, with its expensive mechanism, has kept the price higher than it would have been if given the same conditions under which the gasoline car is produced. Now that one exhibiting maker has found it possible to produce a model at \$1,685 it stands to reason that other makers can do likewise in time, so the effect of price may cease to be a detrimental one.

Many car owners prefer the electric for certain use. Chicago has thousands such. The ease and convenience of its operation eliminates the need, or the wish, for a chauffeur. No water freezes on a cold night while the owner is in the club or in the theater. No balky engine must be coaxed or warmed up before responding. For the short trip it is considered par excellence by its adherents, who often keep the electric in the same garage with the gasoline car that they may have it for these short trips. Classed of old as a woman's car it has been adopted by many

men for the run down to the club, to the office, to see a man.

One of the makers exhibiting this year has sold 3000 of his electrics to Chicago owners. Another, a later comer into the industry, has sold 1000 in Chicago. And so it goes. Sales are reported as increasing rapidly, just as the sale of the gasoline car is increasing rapidly. Statistics gathered by those most interested in the electric show that the small towns have a larger proportion of electrics than they had formerly. One make had an increase of 281 per cent, all told, in 1916 as compared to 1915. The models for 1917 in general are built on newer body lines and are even more luxurious in appointment, while price reductions are the rule also, owing to greatly increased output.

Electric Business Is On Increase

The export business of electrics has increased by leaps and bounds, it is reported, and nearly all the foreign countries are included in the purchases of American-made electric vehicles. Some of the largest exportations are those to South America, China and Norway. The electric taxicab has become by no means an unimportant factor in the manufacture. The town car on display among the electric exhibits represents a type of electric taxicab. This same town car has just been sold in a lot of twelve to a Chicago concern for livery service.

The battery exchange system, which does much to simplify operation of electrics, is popularizing the type. It was developed first in Hartford, Conn., and soon spread to other cities, including Baltimore, Boston, San Francisco and Spokane. Power in general has become cheaper, however, and increased facilities for charging the electric at service station and power houses have been a result.

The system of battery exchange is that of selling electric motor transportation by

Refinements and Price Reductions Mark the Car Over Which the Battery Is King

the car mile instead of selling electric current for battery charging by the kilowatt hour. A central station, say, owns batteries which it leases at a fixed charge for a battery. The customer pays so much for each mile, no matter what distance his car travels. The batteries can be exchanged in a few minutes and the mileage of the car thus is unlimited. Adoption of universal battery exchange systems is yet a possession of the future, but its possibilities are far reaching. As it is, electric charging facilities and electric garages rapidly are being installed, so that it is possible for the electric to be charged practically wherever required. Private charging outfits, also, have been put in the reach of the electric owner for use over night in making his car ready for the next day's requirements.

What attracts the show visitor most about the electric is the body. This is natural, as the electric maker has been putting so much thought into the body for all these years. You will notice that the visitor to the exhibit opens the door, looks within, often sits within and inquires into particulars as to the fittings. The exterior finish, too, is a matter of comment.

The Detroit

The new \$1,775 Detroit coupe is the feature of the Anderson Electric Car Co. exhibit. The lowest priced Detroit electric previously was \$2,275. The wheelbase of the new car is the same as that of the other models, 100 in. The price has been lowered by enlarging the production, cutting down the options in upholstery, using pressed steel instead of aluminum for the fenders and hoods, by eliminating the two expensive curved glass windows in the rear of the sides and by leaving out cut-glass vases, card cases and smoking sets.

This reduction in price brings the total reduction made by this company within the last two years to \$1,100. The 1917 cut is \$500, while those of 1916 were from \$600 to \$725. The new models have been in no way inferior to the old, however. Efficiency methods in production, including chain assembly and standardization of certain parts, are given the credit for the reductions. The same materials are used throughout, but these materials are being



From the Woman's Viewpoint



The Woman of the Family Visits the Show, Too

COLISEUM, Chicago, Jan. 27—That the woman has had a great influence on the manufacture of motor cars is no longer a debatable question with the many. That she will continue to have a great influence on the manufacture of motor cars may be judged from the value of the improvements placed to her credit already and the value of the improvements which she as the main consideration bids fair to bring. Such are the things you can see at the Coliseum if you will.

Much of the ease of operation of the modern car has been a reaction of the woman's inability to shift the stiff gears of yesterday. Brakes have been improved for the less strong powers of a woman driver and to the benefit of both men and women. In the bodies, however, have come the refinements and equipment which have gone to make for greater ease and pleasure of motoring.

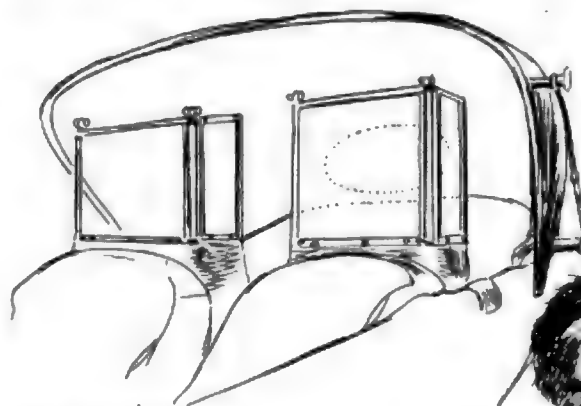
Woman Likes New Jack

And the end is not yet. The long-handled jack is still a new accessory. One of the main reasons why for it no doubt was the woman driver. It was all right to get the jack under the axle of the car. The woman did not get very dirty doing that. But when it came to manipulating the short-handled jack afterward, that was a different matter and one not to be put up with by every woman.

That the woman has played such a heavy role in the motor car manufacture is evident at the show as it never can be evident in any one place other than at a show of similar size and representative importance. The exhibits bear witness to an influence making for more ease and convenience and better artistic construction. The men in charge of the exhibits recognize the power of veto held by the woman in the family by directing much of his demonstrative talk and persuasive gifts toward the woman visitor. In no case is her ideas scorned, either in the factory or in the sale of the finished product.

Educational Models Interest All

The motor show is always interesting, whether the person who enters its doors is there because he or she wants a car or because it is some place to go to see the results of money and brains. Stripped chassis, cutaway cars, engines and countless accessories are displayed as never before, and the public has a chance to inspect them as never before. The woman is an important figure in this public because she pays attention to those things which in the beginning of car production were thought



Even the tonneau windshields are individual

superficial and not at all necessary for a successful power-driven vehicle and which now give to the modern car a point of distinction no less weighty because of its early unimportance.

Consider the body of the car and its design. How far did the maker carry his consideration of what housed the mechanical parts of the car before so many women either became drivers or expressed the wish that the car was not so hard to drive and did not soil their clothes so quickly? Not very far. But today there is no better evidence of the change in the old policy than the motor show at the Coliseum and Armory is offering.

Makers Observe Individuality

More individuality is manifested by each maker. And this individuality is possible to the largest extent through color and body design. Modern cars are not so distinctly different as one might suppose on first thought. They are less different if they are assembled, as not a few excellent cars are. One may have this feature of mechanism; another has one just as big in its field. As to excellence of mechanism, if a car is anywhere near universal in adoption by the public it is of a reliability equal to that of some other car. It is the body that differentiates, for the one who is not a mechanic, at least.

Bright colors in cars have come as companions to bright colors in women's clothes. The range of choice offered in colors makes for individuality. This individuality in colors of which so much notice is taken at the show has been noticeable for quite a while. The tendency to make cars individual by the use of varied finish was strong even before then. Custom body departments have been made a part of many



factories, and several dealers have added such to their concerns.

On the surface, the way men and women inspect cars at the show is this: The man looks under the hood; the woman looks at the body and top. Both has its advantages over the other, if such a paradox is permissible. If the car won't run, why have it? If you can't wear your best clothes in the car without soiling or tearing, and if it is more comfortable to stay at home, walk, or ride in a railway coach, why have it? That both methods of inspection are becoming more reconciled is evident in the common existence of running ability and body utility.

Custom Made Bodies Popular

The number of prospects who demand individual bodies for the chassis of that particular make they buy is increasing. The old custom that Europe had of selling the chassis alone and letting the purchaser reflect individual requirements in body construction is becoming an American custom, more or less. In most cases the body that is a special job is so because some woman

in the family had a preference to be followed.

The women who visit the show this year are taking full advantage of the opportunities the show offers them. Though the opening this afternoon found them greatly in the minority, their number could not be taken as a criterion of their interest. Judging from available sources of information, a larger percentage of the women who attended were there with the prospect of ultimate purchase than the percentage of prospects among men. And the women were not afraid to show their ignorance if they did not know something already about that make to which they were attracted and of which they wished to know.

When in Doubt

When in doubt, sit in it. Such might be the summary of car advice that the woman at the show follows. She is not expected to exhibit interest in the engine, and consequently she does not do so often or for long at a time. But she will try out the distance of the brakes from the driver's seat, the depth of the tonneau seats and so on.

Such advice is not bad, either. If a woman is to drive a car and get full pleasure that is any motorist's due out of driving, there are certain provisions which she must take to insure ease in driving. She never will get all that is due if the driver's seat is uncomfortable, if she cannot reach the levers easily, if the levers take a large share of her total strength. So she does these things, trying the brakes and working the clutch also.

The length of the cars at the show is of more moment to the woman visitor than one would think. She exclaims over the length of the body and the wheelbase and wonders how she could turn around with those cars. Several solve this problem by deciding not to turn around but always go around the block. This length, by the way, is considered to be one of the explanations for the popularity of the roadster, cloverleaf and four-passenger. A woman feels that she can handle the car more easily if it is shorter. However, she also prefers the long body sometimes, in which case she does as many suggest, goes around the block instead of turning.

Electric Still Draws

The electric sustains the interest it has always had among the women. Its silence, as well as the ease of its operation, first drew their preference and held it even when they wanted something that would go faster and longer. Since the gasoline car has been given the quiet motor her allegiance has been shaken, and with the doing away of the gear shift in a few makes it will be shaken further.

The cutaway exhibits at the show draws the woman's attention as it draws the man's attention. There is something impelling about action of any kind that draws the crowd, and the woman makes herself a part of the crowd at the motor show, viewing first this exhibit and then that,

stopping longest at a particularly appealing model and lingering where both car and demonstration are attractive.

Mingling with the some 40,000 persons whom the management estimated were present this first day, the woman sees ensemble for the first time all the improvements she has been reading and hearing about during the last year. Many women are here from outside Chicago, and no doubt if figures of that nature were available it would be found that a fair proportion of the 20,000 out-of-town visitors are women. For often the deciding vote when the family car is in question is cast by the woman of family, and most of these visitors are here because this is the trade show of the year and they expect to buy during the week.

You will notice that the woman is very optimistic about driving a car, even if she is afraid the long car will give her trouble in turning and she will always have to go around the block. From the biggest touring car to the racer, she never doubts for an instant her ability to master the more or less intricate operations that give the driver control. She speaks with proper awe of such things as flexibility, worm and spiral-bevel drive, but if she does not recognize them as familiar acquaintances she trusts with the faith of a good sportsman in the ability of the maker to give her the best possible.

Women Like Silent Motors

The women, perhaps, are the first to prefer the quiet, smooth-running motor, and for this reason are apt to pick out the car with a well-made and well-designed engine, if proper demonstration is given. The show has that disadvantage however, which common sense gives in prohibiting the ordinary running of engines on display. Many of the women express their wish for such a demonstration, and the salesman in charge of the exhibits promptly provides for the fulfillment of this wish with appointments for demonstration with cars from the city agencies.

The woman also wants to know if the mechanism of the car is accessible sufficiently for her to learn to attend to any minor repairs. She is interested in the cowl board also, and when she looks under the body top, as she does often, the cowl board gets a certain amount of inspection. Not only does she wish to have the brakes and levers within comfortable reaching distance, but

she wants a cowl board not over-cluttered with instruments of various kinds. The neater the cowl board, that is, the more smoothly the necessary instruments are attached thereon, the better pleased she is.

The substitution of the hassock for the metal footrail, as demonstrated by the 1917 cars more than by former models, pleases the woman particularly. The metal rail usually resulted in stain to light-colored shoes, and since the light-colored shoe has become so popular the disadvantages of the metal footrail have been more apparent. However, she appreciates the provisions for heating that the footrail disguises, though apparently she would rather have the footrail as an addition to the hassock, so that the footrail would pose only as a heater.

Divided Front Seats Cause Debate

The coming of the divided front seat finds a few disapprovals. The divided front seat in the two-door sedan makes for a cozy, intimate company. But it makes necessary individual robe rails, and while this is desirable in some ways it is not in others. For example, the large coat now in vogue cannot be hung on the robe rail which is merely the width of one front seat without becoming at least slightly wrinkled, if it is the wrinkling kind at all. This arrangement of the front seats in the open car also makes necessary individual windshields if tonneau windshields are provided. This, however, brings little inconvenience, as they are more or less flexible in arrangement, but the advantages of divided front seats are lost.



"Can't you induce your father to buy a sedan?"

Is Average of Human Caution Low?

Figures on Grade-Crossing Accidents in California Indicate Carelessness Is Chief Factor Responsible for Accidents

"SAFETY First," has become a by-word. There are people who carry a pennant on the wind-shield of their cars with the words "safety first," in letters of gold, yet, who will race a railroad train to see which shall be first to reach a grade-crossing.

Safety first, to many, means nothing. It has become a joke. Within the last few weeks, in southern California, a driver, who should have been in a lunatic asylum instead of driving a motor car in which were a dozen or more people, brought instant death to five persons, himself among the number, and serious injury to several others, in attempting to cross a railroad track ahead of a rapidly approaching train. He saw the train, too—had an unobstructed view of it for nearly half a mile. He speeded up his machine and raced with the train for the crossing, both reaching it at the same moment, with the result stated. Who was to blame?

A Case in Point

The average of human caution is surprisingly low. There may be some who will be inclined to dispute this statement, but official statistics prove this to be the case. A few days ago I was walking along the principal avenue of a western city. I heard the rattle and clatter of an approaching electric train. The noise was accompanied by the constant clanging of a gong on a car at the head of the train, which could be heard for half a mile. A flagman stepped out from his little house at an important crossing, waving his flag in either hand, warning all who chanced to be near of the impending danger. At the same moment a motor car was being driven along the crossing street at a speed of perhaps 20 miles an hour. The driver must have seen, if he did not hear the train, but seemingly gave no heed to it whatever, until the flagman ran directly in front of his car, loudly shouting, "Hey,—Look out!"

The motorist then put on the brake, stopping within 3 ft. of the track. The motorman of the train, meantime, seeing the imminent danger, had, at the last moment, thrown on the emergency brake, bringing the passengers from their seats in a sudden and unceremonious manner. The train stopped within 10 ft. of the motor car, then moved slowly ahead, the motorman and motorist glaring at each other as the train passed.

A tragedy had just barely been averted by the prompt action of the flagman and the motorman. The motorist wore the air of a man whose personal privileges had been encroached upon.

Trying to Beat a Train Over Crossing Fool-Hardy Practice That Should Be Made Misdemeanor

Do not think this is an isolated case for it is not by any means. Listen to this, which is from an address by the Hon. A. Gordon, a member of the California railroad commission, delivered at a recent banquet.

"During the three years ended June 30, 1915, 249 people were killed and 1093 were injured at grade-crossings in California. During six months ended Dec. 31, 1915, sixty-five people were killed and 222 injured. During the first three months of 1916, thirteen people were killed and seventy-five were injured, and the record for summer is worse than that for winter.

"California, with less than 4 per cent of the population of the United States, and with less than 2 per cent of the steam railroads, furnishes nearly 5 per cent of the deaths and injuries resulting from accidents at grade crossings on steam railroads."

Here is another statement made by Mr. Gordon that is almost unbelievable, and still, it is of undoubted authenticity. "The Southern Pacific Railroad reports that during the last two years 525 of its crossing-gates were broken by vehicles when closed."

Is the average of human caution low? Just consider the following figures for a moment and judge for yourself:

The Southern Pacific, which has been systematically investigating the causes of accidents at grade-crossings, ascertained through its observers, stationed at thirty-four crossings, the following facts:

Of over 17,000 motor car drivers observed, 69.5 per cent looked neither way before crossing the tracks; 2.7 per cent looked in one direction only, and but 27.3 per cent looked both ways. Of these, 3300 drivers, or 19.3 per cent, ran over the tracks at reckless speed. Only thirty-five drivers, or two-tenths of 1 per cent, stopped their machines before crossing the tracks.

There were also observed 4900 drivers of teams, of whom 39.4 per cent looked in neither direction on crossing the tracks; 5.6 per cent looked one way only, and 52 per cent looked in both directions. It will be observed that, according to these figures, drivers of teams have nearly twice the caution of motorists, due, possibly, to less confidence in the team than the driver has in his machine—and in himself.

Nor are the drivers of teams and cars alone in this lack of caution, for out of 6300 pedestrians observed 49.1 per cent, about one-half of the total number observed, looked neither way; 15 per cent looked in one direction only, and 35.9 per cent looked both up and down the track before attempting to cross.

The numerous accidents are due to various causes. A careful tabulation of grade-crossing accidents during the last five years in California gives the following interesting results:

	Killed, per cent	Injured, per cent
Ignored train and its warning	35.0	37.1
Ignored train and its warning, and warning of crossing-bell, automatic and human flagman and warning of other persons	13.3	12.6
Ran into the side of the train.	10.1	15.3
Stalled on the track.....	7.8	4.2
Tried to beat train to crossing	16.0	9.3
Other causes	17.3	21.5
Total	100.0	100.0

In the State of California there are no less than 10,000 grade-crossings of streets and highways over railroads. There are a comparatively few crossings where vehicles pass over the tracks on viaducts, bridges, or other similar structures, or beneath them in subways. It is estimated that the cost of changing a single grade-crossing to one of the over or under type, would be about \$30,000. So, to make all grade crossings in California safe in this respect, it would cost about \$300,000,000, which is an expense that would bankrupt the railroads should they be compelled to meet it.

Los Angeles Experimenting

In the city of Los Angeles an experiment is being tried in the hope of decreasing grade-crossing accidents. This consists in constructing a gutter-like depression across the street or roadway a short distance from the railroad tracks. This device is calculated to cause drivers to bring their cars to a standstill, or, at least, to slow down to a speed which will admit of crossing the gutter without wrecking the car, and this, it is argued, will greatly lessen the probability of the machine colliding with passing trains. Doubtless these gutters will be the cause of an abundant and varied profanity, but if the scheme is successful it will save the lives of many human beings.

The most effective remedy, it seems, lies in educating the people to the danger,

the foolhardiness, of crossing railroad tracks without looking both ways, and then, not attempting to cross the track if a train is approaching within a distance which involves any element of danger. One of the best suggestions thus far made, looking to a decrease of accidents of the kind mentioned, is the enactment of a law requiring all drivers of cars, teams, and vehicles of every description, to drive slowly upon approaching a railroad crossing. Most of the accidents occurring at grade-crossings are known to have taken place when the vehicles were running at anything but a moderate speed, and if the law required the drivers of machines to come to a stop, before crossing the track, without doubt, the toll of human life due to accidents on grade-crossings would be materially reduced.

There are other ways of incurring injury, or of meeting death on rail road tracks, than those that occur at grade-crossings. One of these is walking on the railroad right of way. Thousands of persons commonly walk on railroad tracks, and particularly where taking the track admits of making a short cut. Official statistics show that in the United States, during 1914, no less than 5396 persons were killed, and 6176 were injured while walking, or, at least, trespassing on the railroad right of way, and it is stated that the figures for that year were not higher than usual. According to this, about 11,500 persons are annually killed or injured while trespassing.

In the past twenty-five years, according to Mr. Gordon, over 212,000 people have been killed in the United States in railroad accidents, and of this number, which would have constituted a very respectable army before the present war in Europe, over 112,000 were trespassers. One would naturally think that by far the greater number of these unfortunates were tramps and hobos, but such is not the case, for 75,000 of them were citizens who lived in the immediate vicinity of the scene of their death, and of these not less than 13,000 were school children under the age of eighteen years.

HARTFORD AMPLIFIES TRAFFIC CODE

What may be regarded as the first step in the absolute regulation of traffic in Hartford, Conn., is the restriction of streets in the business district to vehicles bound in one direction only, east or west. Dec. 27 the Common Council approved a resolution covering the situation which is now effective. All traffic on Asylum street from Main street to High street, a distance of 2000 ft., is confined to the west. All traffic on Pratt street 600 ft. long is easterly. All traffic on Kingsley street, 450 ft. long is west and on Temple street, 450 ft. long, is east.

The fire department is living up to the requirements while as a matter of fact it could be considered immune because of the peculiar nature of its business. All ve-

hicles are ordered to keep to the right side of the road, those moving slowly as close to the curb as possible, this because the fire department has a habit of traveling fast and needs the room. All cars may now draw up to either curb in the one-way area but must be headed in the general direction of traffic. Other streets are

under consideration for similar treatment as for instance Church and State streets.

An effort will be made in this session of the legislature to provide a penalty for the drivers of horse vehicles who do not display a light at night. The present law requires a light but there is no provision for fine in case of violation.

Winter Cold and Motor Heat



Sylphon regulator with shell out away. The upper valve is for overflow and the lower for radiator water

IT'S all right in the summer time, but what about winter? That question has confronted designers of motor cars for a number of years and its application is to the method of regulating the temperature of the engine. It is granted that an engine burns less gasoline, gives more power and is all around more reliable when it is operating at an approximate fixed temperature. Gas entering a cold engine receives a cold welcome, and in discouragement it condenses and strays back down the manifold in liquid form or otherwise fails to burn. If the motor is too hot the lubricant burns out, the metals become unduly expanded, and what may happen can be termed in the maximum with a cracked cylinder or broken connecting rod, and in the minimum with a generally indisposed engine operation.

The Chicago motor car show displays three interesting developments along this line. One is the thermostatic method of water-heat control. In this system an automatic-operating device is inserted in the water line between the engine and the radiator, the function of which is to keep the water in the engine until it has arrived at the efficient operating temperature and then let it circulate through the radiator at a rate which will maintain, closely, this efficient operating temperature.

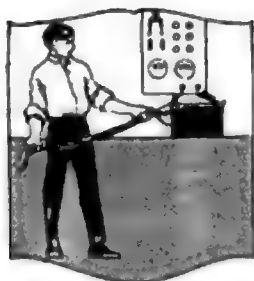
Another method is that used by Hudson and the new Columbia. It is the cooling air that is tackled with this system, instead of the water, although it operates to gain the same end, namely, to keep the engine at an efficient operating temperature. On the front of the radiator is provided a shutter—just like the blinds one finds on

the old colonial houses. This shutter may be opened and closed at the will of the driver, from the dash, cutting off the air supply. In conjunction with a Boyce Moto-Meter the driver can so regulate the shutter that the liquid in the Moto-Meter tube will stand at the efficient temperature mark at all times.

The third method is the use of the Boyce Moto-Meter either in conjunction with the radiator shutters, as described above, or with the use of radiator covering and hood covering to retain the heat in cold-weather driving. This little instrument, which is screwed into the filler cap of the car, tells the driver at a glance just how his motor is acting as far as heat is concerned. Incidentally, one of its big functions is letting a man know when his oil supply is exhausted while there is yet time to save the engine from serious damage. If the Boyce instrument shows that the heat is mounting excessively and in a short time, the driver can look to his oil supply first, then if everything is all right there he can turn to the fan, water pump, etc. Without it his first knowledge of something wrong comes when the engine begins to pound.

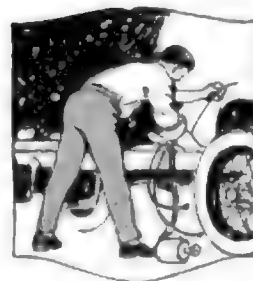
Reverting to the thermostatic principle of water regulation. The Sylphon regulator, made by the Fulton Co., is finding its way into many of the more costly cars. Among the users of this instrument are: Cadillac, Chalmers, Haynes, Marmon, Packard, Premier and Westcott. The Oldsmobile uses its own system.

The Sylphon regulator consists of a thermostat coil and a valve housed within a unit which fits into the water line. For application to pump systems it is placed on the bottom water line. For application to thermo-siphon systems it is placed on the top water line. It is connected to a by-pass hose which runs from the thermostat box to the opposite hose line in back of the radiator. When the engine is cold the thermostat coil is contracted and the valve between the motor and radiator is shut. The water is then by-passed through the auxiliary hose and sent back into the engine without receiving the cooling effect of the radiator. As the water becomes heated the thermostat coil expands, opening the valve in proportion to the increase in heat until the efficient operating temperature is reached. Should the water temperature start to recede from this efficient mark, then the valve in the regulator begins to close and part of the water is by-passed directly back into the cylinder.



Electrical Equipment of the Motor Car

By David Penn Moreton & Darwin S. Hatch.



Editor's Note—Herewith is presented the twenty-ninth installment of a weekly series of articles which began in *Motor Age* issue of June 29, designed to give the motorist the knowledge necessary to enable him to care for and repair any and all of the electrical features of his car, no matter what make or model it may be. At the conclusion of this series, "Electrical Equipment of the Motor Car," with additions, will be published in book form by the *Class Journal Co.*, Chicago, in a size to fit the pocket conveniently. It is expected that the book will be published about April 1.

WHAT HAS GONE BEFORE

The fundamentals of electrical circuits of the motor car were explained through their analogy to water systems and the relations of current pressure and resistance brought out. This was followed by an explanation of series and multiple circuits, and how electricity is made to do work in lighting, starting, signalling, etc. Calculating the capacity of a battery for starting and lighting and the cost of charging storage batteries and determining the torque a starting motor must develop were explained. Action of primary batteries and dry cells was taken up, and the best methods of connections. A separate section was devoted to the makeup and action of lead and Edison storage batteries, and another to the care of lead batteries in service and best methods of charging them. Magnets and electro-magnetism then were considered and the principles of generators and motors explained. A section on generator output was followed by one on the purpose and operation of the cutout. The section on Electric Motors began in the issue of Dec. 14.

Part XXIX—Electric Motors

THE relative positions of the commutating planes for a generator and a motor are shown in Fig. 180, the full line representing the commutating plane of the motor and the dotted line representing the commutating plane of the generator. The direction of current in the armature wires corresponds to the motor connections, and the direction of rotation will be as indicated by the curved arrow. The wires between the two commutating planes on one side of the armature can be thought of as being in series with the wires between the two commutating planes on the opposite side of the armature and forming a number of complete turns about the armature core. The remaining wires may be thought of as forming a second set of turns. The product of the turns in the angle between the commutating planes and the current in each of these turns gives the value of what is called the demagnetizing ampere-turns, because their effect is to produce a weakening of the magnetic field of the machine. The product of the remaining turns and the current they carry gives the value of what is called the cross-magnetizing ampere-turns, because they act at right angles to the magnetizing effect of the field current of the machine. The turns in the angle between the commutating planes are called the demagnetizing, or back, turns and the remaining turns are called the cross turns.

Commutation

The process of commutation can be explained by reference to a simplified diagram of the armature winding as shown in Fig. 181. The commutator segments are marked C1, C2, C3, etc., while the various parts of the armature winding called elements and marked 1, 2, 3, etc., are shown connected in series, the terminals of these elements being connected to the commutator segments in regular order. The position of the neutral plane is represented by the line AC, the direction of rotation by the large curved arrow, the direction of the polarity of the part of the pole shown to the right by the letter S; and the current in the various elements of the winding by the small arrows. With the direction of current in the elements of the armature winding corresponding to that shown in the figure, the brush B must be negative in the case of a motor.

As the armature rotates the commutator segments in turn pass under the brush, and if the arc of contact of the brush on the commutator is greater than the width of the insulation between the commutator segments, which always should be the case, then an element of the armature winding will be short-circuited when the

brush is in contact with the two segments to which the terminals of the element are connected. When an element becomes short-circuited by the brush it is no longer directly in series with the elements of the armature winding to its right or left, and the current in the element will drop to zero value, provided there is no electromotive force induced in the element, or it is moving parallel to the magnetic field. It does not do so instantly on account of a property of the element, called its inductance, which tends to prolong the current. As the armature rotates one of the commutator segments to which the short-circuited element is connected moves out from under the edge of the brush and the short-circuit on the element is removed, and the element becomes a part of the circuit through the armature to the left of the brush. When the element which was short-circuited becomes a part of the left-hand path through the armature, it must carry the same current the other elements in that path carry, regardless of the value of the electromotive force being generated in the element, because they are all directly in series. If the short-circuited element has zero current when the short-circuit is removed by one of the segments moving from under the brush, the current in the element must increase almost instantly to a value equal to the current in the elements in the left-handed circuit through the armature. A property of the element, inductance, opposes this sudden increase in current, and as a result there is a tendency for an arc to form between the edge

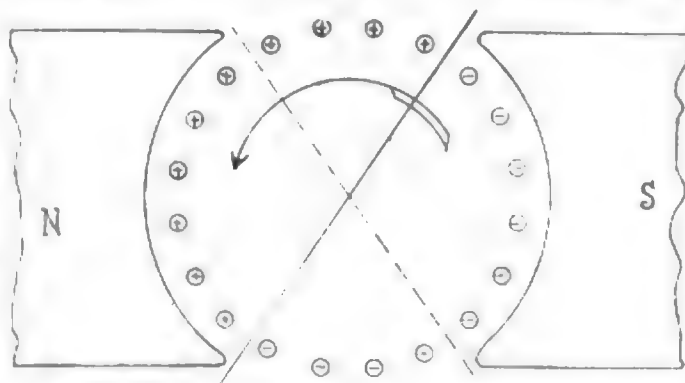


Fig. 180—The two lines show the relative positions of the commutating planes of a motor and a generator



The Motor Car Repair Shop



WHEN A CONE CLUTCH SLIPS

There Is a Method of Washing Plates Right, Which, If Properly Done Is Very Effective

IT occasionally happens that a car is brought into a repairshop with a complaint that the clutch slips in starting, takes hold too slowly, etc. When a disk clutch of the running-in-oil type begins to slip the trouble is generally due to bad adjustment, too much oil, or an oil of too heavy a grade. To treat a slipping clutch of this kind one should turn the flywheel over until one of the oil plugs can be removed, pour in about 1 pt. kerosene oil, replace the plugs, then have someone turn the engine over very slowly, possibly with the starter, while the clutch is worked in and out for a few minutes. In this way the kerosene comes in contact with all of the internal mechanism of the clutch and letting the clutch in and out forces the kerosene in and out between the disks, thus washing away the sticky oil.

Some repairmen endeavor to clean the clutch in the above manner, but instead of turning the engine over slowly by hand, or with the starter while the clutch is being worked in and out, they do it while the motor is running under its own power, ignoring the fact that as the clutch revolves at such speed that the oil is held to the sides of the case and therefore does not flush the plates as it should. This method will meet with fair success however, if a sufficient amount of kerosene is used. After the clutch has been thoroughly flushed, drain off the mixture of oil and kerosene and flush out the housing with a few gunfuls of gasoline, then refill with the required amount of oil.

Another Cause of Slip

Another cause of clutch slippage is the glazing of disks. This occurs more frequently with dry-plate types, but the oil-bath types are not entirely immune. By frequent manipulation of the clutch, the bulk of the oil is forced off of the clutch by centrifugal force and what remains is rapidly burned by friction, forming a glass-like surface of carbon which greatly impairs the adhesion of the disk surfaces. When this condition is found mere flushing out with kerosene will not answer, for although kerosene will cut the glaze to some extent, it will immediately harden again if not removed.

To remedy this, after the old lubricant has been thoroughly cleaned out, the engine should be run at a moderate speed, and with the gears in mesh and the hand brake set, the clutch should be worked in and out almost stalling the motor at each partial

engagement. This will rub the carbon, loosened by the kerosene, off of the disk faces and centrifugal force will carry it to the outside where it may be readily washed out.

Making Gaskets

The gaskets between the bases of the cylinders and the crankcase or similar joints are often made by stretching drawing paper or wrapping paper over the base of the cylinder and while holding the paper

firmly in place with one hand, operating a machinist's hammer by tapping the round end of the hammer around the edge of the casting. This will cut the gasket out to the exact outside shape required. This method is often employed in making gaskets for aluminum parts, but results in damage to the castings if one is not particular how he performs the operation. Aluminum is soft and the edges may be very readily broken down.

To make a gasket for an aluminum case the paper should be pressed over the bolt holes and edges of the case so that an impression is made that can be easily seen. The gasket can then be easily cut out with a pair of scissors or a knife and much less time than would be required to do it with a hammer. Grease should be spread over the aluminum before the paper is applied to make the paper adhere to the metal.

Lead, copper and asbestos gaskets for flange connections of the manifolds can be made easily with the round end of a machinist's hammer in the same way paper gaskets are made. In making gaskets from wire asbestos sheet packing, the hammer cannot be used to advantage and it is better to cut them out with a pair of tin shears.

Determining Oversize Tires

Determining the oversize of a certain tire is a simple matter and may be done mentally. We can explain the method best with a concrete example. A 34 by 4-in. tire has 4 in. of tire on two opposite sides of the wheel, making the total tire thickness 8 in. This subtracted from the diameter of the tires, gives 26 in. as the wheel diameter and the inside tire diameter. Any other tire with an inside diameter of 26 in. will fit the same wheel. A 35 by 4½-in. tire has 9 in. total thickness and this subtracted from 35 gives 26 in. for the necessary wheel diameter; hence, a 35 by 4½-in. tire is the oversize for a 34 by 4. In all cases then, subtract twice the tire cross-section from the tire diameter to get the wheel size or inside tire diameter.

Tire Hints

When there is no cement at hand in an emergency case, a good adhesive may be made by dissolving small pieces of rubber in gasoline or benzine. When on the road it is sometimes a difficult matter to obtain small pieces of rubber and in an absolute emergency, especially at night, motorists have resorted to cutting off small strips from a tire casing.

Give Us Your Ideas

MOTOR AGE readers are constantly devising little kinks and methods whereby they save themselves considerable unnecessary labor when performing repair operations about their cars. Why should these go unheard of by our readers? If you love your neighbor as yourself, let him have your ideas through the columns of MOTOR AGE.

You may have some simple method of cleaning spark plugs. You may have some simple, possibly crude, tire tool of your own invention which does the work the way you think it should be done. You may have built a motor stand for a garage, a jack, a thousand other things. If you find these useful, why should not others?

You may have become so proud of that device you built that you took a photograph of it. Send us the photograph with a description. If that is not available draw a rough sketch of it and indicate in your description what that sketch is all about. If we think the device is of merit, it will appear in MOTOR AGE with your sketch, no matter how poor, transformed into a drawing by MOTOR AGE draftsmen.

Do not limit it to material things only. Let us have your hints on proper methods of cleaning the car and its parts, simple ways of adjusting the motor, the carburetor, etc. If you know how to do it tell the MOTOR AGE repair shop. If you do not know how to do it ask the MOTOR AGE clearing house.

is taught? And what would be the cost of a course?—David Halferty.

1—It is not. The valves are located in the side.

2—There is no official record of the speed, although the writer can testify that it is well above 65 m.p.h.

3—There is no official record of the speed of this car.

4—To our knowledge there is no school where this is taught. There is, however, a good instruction book covering this subject. It is entitled "Oxy-Acetylene Welding and Cutting." The author is Harold B. Manly and the publisher Frederick J. Drake & Co., Chicago.

Delco Repairman's Book

Des Moines, Ia.—Editor MOTOR AGE—I understand the Delco people publish a booklet for the benefit of the repairman, giving advice on locating trouble, making adjustments, etc. Are there any other electrical equipment or carburetor houses doing the same? If so, kindly publish their names and addresses.—M. W. Shay.

To our knowledge there is no manufacturer putting out a book on just the same lines as this Delco publication you refer to, but all the makers have very comprehensive instruction books covering their various products.

OIL THICKENS AFTER 500 MILES This Is No Sign of Engine Trouble—Oil Should Be Removed

Forestville, Wis.—Editor MOTOR AGE—We have been having trouble with the oil in our 1914 Case 25 becoming thick after 500 or 600 miles of running, and it would be necessary to remove the thick oil and put a new supply into the crankcase. It is not in the oils, as we have tried various grades and kinds with the same result. The power is good, the compression fair. What causes this thickening of the oil?

2—What is the r.p.m. of this model?

3—What is the r.p.m. of the Paige 6-16 Fairfield, also the speed?

4—Several car owners have been using kerosene in the radiators as an anti-freeze solution. Is kerosene all right, or is it dangerous, and would it harm the engine and radiator in any way?—Wendell Rose.

1—In the first place the oil should be flushed out every 500 or 600 miles of running. This motor is very economical in oil consumption and retains what is put in it for considerable time. The result is that the old and much used oil thickens as any oil will when long subjected to heat

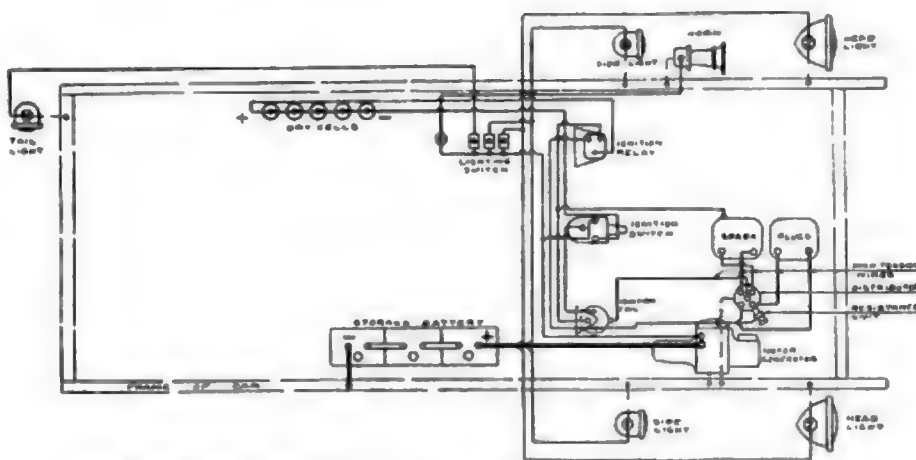


Fig. 3—The Delco system used on the Buick 1914 model B-24 was wired as shown in this diagram

and carbon. If you want your engine to live a long life clean the oil out of the crankcase every 500 miles.

2—There is no recognized record of maximum engine speed, if that is what you refer to.

3—Regarding the engine, the answer to question No. 2 applies. There is no official record of the speed of this car.

4—Kerosene is not advised by MOTOR AGE. It is harmful to the rubber hose.

Motor Car Engine for Hoist

Beaumont, Tex.—Editor MOTOR AGE—I have an old 1910 Mitchell car, the chassis and engine of which are in good shape. I wish to make a hoisting engine of it. Is this engine adapted to such work, and will Motor Age give me suggestions as to the best method of doing the work?—J. M. Lowry.

The engine should be very well adapted for hoisting work. You do not tell us what kind of work you have in mind, however. If you will give us an idea of this possibly we can devise a sketch of a simple way of stringing up this motor to perform such work.

Ford Power at 2000 R.P.M.

Grantville, Kan.—Editor MOTOR AGE—They sell the Ford as a 20-hp. car. I figure that at 2,000 r.p.m. its engine will give 25 hp. Am I right?—Stephen E. Smith.

The S.A.E. rating of the Ford motor is 22.5. This is based on the supposition

that a motor will develop its rated horsepower at 1000 ft. piston speed per minute. At 1000 r.p.m. the piston speed of a motor with 4 in. stroke, which is Ford size, is approximately 1333 ft. per minute. Using the S.A.E. formula of horsepower calculation the horsepower at this speed would approximate 30.5.

READER'S CURE FOR OIL PUMPING Explains Methods He Uses to Seat Pistons and Rings Properly

Charlotte, Mich.—Editor MOTOR AGE—I have noticed many people ask regarding oil pumping, that is, where the oil gets past the pistons, and they have put in non-leaking rings which did not cure the oil pumping, so I wish to tell how I have cured a number of them.

First, if you want to go to the expense of lapping in .003 or .005 oversize pistons my advice is, do not do this yourself as the ordinary motorist knows nothing of this and would ruin the motor. Have a good mechanic do it. But the most important part I have seldom seen done, and a little thought would make it plain to anyone. That is, lap the rings to the piston and lap every ring to a good smooth seat on its individual groove. Do not get them mixed when assembling.

Oil does not work around the rings to my way of thinking, it works between the ring and the piston in and out, and a roughly machined ring and piston will let lots of oil get by. It is the same as the valves. A poor valve seat and you have no pep in the motor at all. Have them ground in and it improves the action of the motor. It is the same with the lapping of rings, it makes a tight seat and the oil cannot get by.

Also, have a machinist cut a chamfer below the lowest ring groove of about one-third the depth of the groove and drill six or eight $\frac{1}{8}$ holes through the same chamfer so that the bottom ring will act as a scraper. Now this chamfer above will not stop the oil. I have tried it.

Again, I have lapped and chamfered

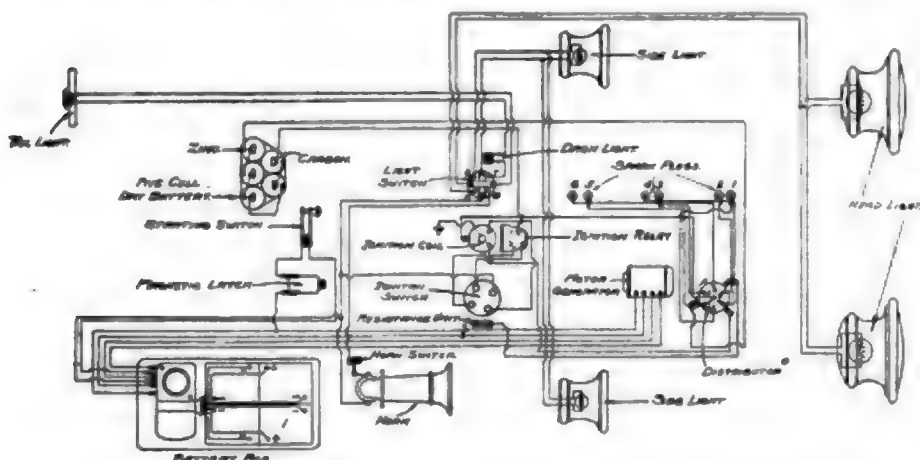


Fig. 4—The Coils 1913 model 4-40 was equipped with a two-unit, double wire Delco outfit wired as shown above

carried on a slant of 15 deg. This is not only for appearance, but greater cooling efficiency is claimed because the air is forced through the radiator with greater friction than is possible with the vertical type.

The engine is mounted on a sub-frame which is extended back to carry the gearset and clutch. Behind the gearset the drive shaft is exceedingly short. The greater part of the distance between the rear axle and the engine is taken up by the clutch housing and by the transmission members. The clutch is a Helo-Shaw of standard form with regulation V-grooved twin-plates of phosphor-bronze operating against steel plates in a bath of oil. This is housed in an oil-tight housing back of the flywheel and connects with the main shaft of the gearbox through a universal coupling.

Gearbox a Fageol Design

The gearbox is entirely a Fageol design mounted in a bronze and aluminum case. The box provides three speeds forward and reverse and the ratios are such as to provide 5 to 1 on first, $2\frac{1}{2}$ to 1 on second, and $1\frac{1}{4}$ to 1 on third. The novel feature of the case is that the main box and the supporting arms are of manganese bronze and so arranged that the main shaft and countershaft mounted one above the other are just half within the case as shown.

The upper section of the case is cast integrally with the brackets and forms a housing for the shifter lever, shifting mechanism and emergency brake lever. The object of this form of case is to permit a thorough inspection of the gears and bearings simply by removing either the upper or lower section of the case. A semi-floating rear axle is used with the shafts carried on Bock taper roller bearings and with chrome nickel steel used for the driving members.

The brake layout has been given particular attention with the foot brakes mounted on 16-in. ribbed drums bolted on the rear wheels and the hand brake operating against the 12-in. ribbed drum on the main transmission shaft just back of the gearbox. The springs are semi-elliptic.

Alloy pressed steel is used for the chassis frame. This is a special design in which the side rails are 2 in. wide and $6\frac{1}{2}$ in. deep, with the forward end narrowed down to 29 in. to permit of easy turning. The main sills of the frame are directly under the main sills of the body, with the front and rear springs directly under the main frame member. The wheelbase is 135 to 145 in., according to the body model desired.

The steering gear is especially built for the car and is bolted directly to the sub-frame. A secondary support is secured in the aluminum dash which provides for adjustable rake of the steering column to fifty individual requirements.

The control levers are designed to be in

such a position that the driver will drop his hand naturally from the steering wheel to the emergency brake or the gear control lever. Ivory mounting is used for the levers in the quadrant which is at the center of the wheel.

Starting and lighting is by a 12-volt system with the head lamps mounted on the radiator. The engine is illuminated by two special lights when the bonnet is raised.

Copper is used for the 25-gal. gasoline tank, the material being formed from 12 gage sheeting and the tank fitted with a magnetic gage indicating the extent of the gasoline supply. The wheels are wire with plain clincher rims and fitted with 34 by $4\frac{1}{4}$ cord tires. Two complete spare tires and wheels are provided.

Several features about the bonnet are exclusive, particularly the ventilation which is protected by patent applications. There are six triangular curved ventilators which are designed to clean out the air beneath the hood. These projecting ventilators start with a line flush with the top of the hood, tilt upwards and backwards for a length of 6 in. The rear opening may be closed at will with a waterproof door controlled by a hand lever on the dash, making the hood entirely water-proof.

Individual Features

Another individual feature on the bonnet is the use of vault lock latches. The handles of these are ivory and the latches are always under spring tension to prevent rattle. The instrument board is also patented and is in the form of a single panel through which the recording hands of the different instruments extend and over which a single piece of plate glass is fitted. The windshield, also, is a special design and is claimed to be entirely rain-proof. The glasses lap over each other by 3 in. when they are entirely closed.

At the back of the body there is a substantial luggage carrier made of bronze and brass, hand finished and nickel plated. All the tools are made of high-grade steel and nickel plated socket wrenches are provided to fit every bolt in the entire engine and chassis. The tools are mounted in flush line receptacles and when the tool box lid is opened a table is formed with all the tools in their places and ready for use. The box is designed so that it is lighted automatically.

DEALERS WIN LICENSE POINT

Los Angeles, Cal., Jan. 26—The motor car dealers of California have won out in their contention that the state motor vehicle department had no right to refuse to issue licenses to dealers who had failed to supply the department with reports of sales made during 1916. Superintendent French met in consultation with representatives of the dealers and declared his department is empowered legally to compel them to do the vast amount of clerical work involved in preparing reports, but he only seeks to prevent abuse of the dealer privilege and if the suits entered

against the department were dismissed he would have licenses issued. Upon this promise, the suits have been withdrawn, dealers are to have as many number plates for cars as they need and they agree to recognize the state's authority relative to reports.

VAN SPEEDMETER STOCK

Van speedmeters have been made stock equipment on the Wolverine of Toledo, New Era of Joliet, Ill., and the Pennay, Pittsburgh, Pa. The Drummond, HAL-Twelve, Jeffery, and Princess use Van Sicken speedmeters as stock equipment in addition to the cars shown with this equipment in the specification tables of the issue of MOTOR AGE of Jan. 4.

CALIFORNIA LEGISLATION BROAD

Los Angeles, Cal., Jan. 26—Recommendations for legislative amendments to the laws of California have been made to the legislature now in session, which, it is hoped by the proponents, will make the thriving business of stealing motor cars less attractive in this state. The recommendations were adopted as the result of a conference between chiefs of police, attorneys and representatives of motoring organizations.

The following are included in the suggestions for amendments:

Application for registration under oath with severe penalty for perjury.

Registration and identification card, with signature of car owner, to be carried in transparent case on instrument board.

Each transfer of car to appear in indorsement on back of certificate of ownership.

Each driver to have operator's license costing 50 cents in addition to regular registration fee.

Two hundred thousand dollars or more to be collected from operators' fees to be applied for establishment of state patrol system of highways, inspectors being given police powers, including the making of arrests in speed and road rule violations.

Each trailer, whether commercial or passenger, to require license. Fee to be \$1 or \$2 additional.

It also is proposed that some plan be put into effect whereby fines imposed by local courts for violations of the motor vehicle act may be used for road construction purposes in the counties where the offense is committed. At present, neither the counties nor the highway commission builds any roads in municipalities. In many places throughout the state an improved road leads up to a town's municipal limits and resumes again on the opposite side, but the intervening distance is in poor condition. It is proposed to amend the laws so that the counties, under reasonable circumstances, may build or assist in building sections of roads within municipalities.

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tand complete services here. About 100 men will be employed. During the 1916 season, the company sold 2200 Overland and Willys-Knight cars.

To Have New Home—Fred P. Brand Motor Co., Cleveland agent for Pierce-Arrow cars, will erect a new fireproof building with sales, service and garage departments at a cost of \$150,000.

Peed With N. Y. Overland Co.—L. G. Peed, manager of the Philadelphia branch of the Maxwell Motor Sales Corp., has resigned to join the staff of the Willys-Overland Co. in New York.

Opens Branch in Buffalo—The Pennsylvania Rubber Co., New York, has opened a branch in Buffalo with A. R. Wendell, formerly of the Pittsburgh branch, manager. A full stock will be carried.

Sales Company Formed—The firm of Nickels, Jackson & Lavenberg has been formed at Toledo, Ohio, to handle the agency for the Stearns-Knight cars. The company was incorporated for \$25,000.

Amazon Agency in Cleveland—The Amazon Tire & Rubber Co., Akron, Ohio, has appointed the Strong, Carlisle & Hammond Co. Cleveland distributor. The tires formerly handled by the Cleveland concern will be dropped in favor of the new anti-blowout tire.

Darland Managers Tulsa Co.—C. E. Darland has been appointed general manager of the Tulsa Automobile Co., Tulsa, Okla. W. A. King has been made factory and production manager. The Tulsa Four, the company's product, was recently exhibited at a Tulsa hotel.

Empire Tire Co. Reorganizes—The Empire Rubber & Tire Co., Trenton, N. J., has reorganized with a capital of \$450,000. J. E. Baum, director of the Corn Exchange National Bank, New York, and president of the Supple-Riddle Hardware Co., Philadelphia, heads the reorganized company.

Changes in Milwaukee National Agency—The Olympian Motor Sales Co. of Milwaukee has been organized with Dr. J. F. Schreiber as general manager to distribute the National and Olympian in this territory. Dr. Schreiber, who is one of the earliest motor car dealers in the northwest, recently withdrew from the Schreiber-Boorse Motor Car Co., Milwaukee, distributor of the National

and Chandler. The last-named car is now being distributed by the Achen Motor Car Co., Milwaukee, of which H. C. Boorse is a large stockholder.

Tubeless Tire & Rubber Co.—The Tubeless Tire & Rubber Co., Millersburg, Ohio, has increased its capital from \$75,000 to \$1,000,000.

East Palestine Rubber Co.—The East Palestine Rubber Co., East Palestine, Ohio, has increased its capital from \$500,000 to \$1,000,000.

Schwartz Wheel Plans Extension—The Schwartz Wheel Co., Philadelphia, has purchased ground in Frankford adjoining its property on which it will build a new plant. The lot is 163 by 207 ft.

Parker on Long Trip—Walter E. Parker, president of the Commerce Motor Car Co., Detroit, sailed from Vancouver Jan. 25 for Singapore. He also will visit the Federated Malay States and other neighboring countries.

Course for Motor Car Men—The University of Michigan will provide a short course, commencing next summer, for men interested in the motor car industry. It will include mechanical engineering, sales work, operation and design of the motor car.

To Supply Aeroplane Bearings—D. W. Rodger of the Muzzy-Lyon Co., Ltd., manufacturer of motor bearings, has completed arrangements with the Duesenberg Motor Co. to furnish it with bearings to be used in the motors it is now building for the government aeroplanes.

Kunz Machinery Co. Reorganizes—The J. L. Kunz Machinery Co., Milwaukee, which was established 25 years ago, has reorganized as the Kunz Wheel Co. with \$100,000 capital to devote its attention exclusively to the manufacture of resilient sheet steel wheels for motor cars and trucks.

Hayes Co. Stock on Sale—The stock of the Hayes Mfg. Co., Detroit, which recently increased its capital, is being offered for sale. The stock offered amounts to \$625,000 and is the new issue, the concern now being capitalized at \$1,500,000. The dividend rate is 12 per cent, payable quarterly. The business of the company has increased from \$750,000 to \$3,500,000 within the last 2½ years and net earnings applicable for dividends have increased from \$103,769 for the fiscal year end-

ing June 30, 1915 to \$290,000 for the period ending June 30, 1916. The new stock is to be listed on the Detroit Stock Exchange.

Black Heads Philadelphia Branch—Robert F. Black, formerly of the factory of the International Motor Co. at Allentown, Pa., has been made manager of the Philadelphia branch, handling Mack and Saurer trucks.

To Manufacture and Job—The Trindl Machine Works has been established in Chicago to make and job pistons, piston rings, wrist pins, crankshafts, valves and so on as well as to do general machine work. Joseph H. Trindl, formerly of Trindl & Ryser, is head.

To Give City Auditorium—The Packard Motor Car Co., Detroit, plans to include a large auditorium in its new sales and service building, and this auditorium is to be given over to the city for use. The structure is to cost \$1,000,000 and will cover a block. The site was purchased several weeks ago.

Chicago Dealer Holds Convention—A mid-winter convention of associate dealers of the Centaur Motor Co., Chicago Jeffery dealer, was held at the company, salesrooms recently. Sixty-seven dealers attended, and they were taken to Kenosha, Wis., in special Pullmans to inspect the Nash factory. On their return to Chicago they were the guests of the Chicago agency at the theater. The convention was such a success that it is to be held semi-annually.

Buys Potter Mackie Mfg. Co.—The North American Motors Co., Pottstown, Pa., which was incorporated last November to make gasoline engines for motor cars and for general machine work, has bought the assets of the Potter Mackie Mfg. Co. This spring it expects to build a plant on the 4-acre plat it owns at Pottstown and will manufacture 45-, 30-, and 20-hp. engines, formerly made under the name of Hazard, for commercial vehicles.

Goodyear Teaches Deaf Mutes—The Goodyear Tire & Rubber Co., Akron, Ohio, has expanded its factory schools to include the deaf mutes who work for it. Business arithmetic, English and mechanical drawing have been found to be most interesting to them. Other subjects will be added from time to time. Ashland D. Martin, himself a deaf mute and a graduate of Gallaudet College, is director of the new undertaking.

Buffalo, N. Y.—Lutz Motor Co.; capital stock, \$200,000. John H. McLean, George H. Hurd, George H. Lutz, Orman H. Lutz and Levi R. Lupton.

Chicago.—Ames Tire Co.; capital stock, \$10,000; incorporators, Willard C. Campbell, Isaac C. Ames and Francis C. McCarty.

Chicago.—National Motor Sales Co.; capital stock, \$10,000; incorporators, George Pearson, Samuel L. Cohen and Thomas M. Whitson.

Columbus, Ohio.—Sawdow Motor Truck Co.; capital stock, \$20,000; to deal in motor trucks; incorporators, M. A. Corbett, R. J. Corbett, P. L. Cordray, H. B. Sawyer and J. M. Halliday.

Cincinnati, Ohio.—Cincinnati Lea Tire Co.; capital stock, \$5,000; to deal in tires; incorporators, Harry F. Thompson, William J. Hieker, A. P. Miller, Carl A. Tottenborn and Ernst A. Tottenborn, Jr.

Cincinnati, Ohio.—United States Truck Sales Co.; capital stock, \$10,000; incorporators, H. C. Stewart, H. S. Stewart, O. L. Carpenter, M. H. McLean and Joseph R. Menzinger.

Covington, Ky.—Theissman Auto Supply Co.; capital stock, \$7,000; incorporators, W. M. Theissman, John R. Theissman and H. D. Theissman.

Covington, Ky.—S. Truck Sales Co.; capital stock, \$10,000; incorporators, R. C. Stewart, R. S. Stewart and G. J. Carpenter.

Denver, Colo.—Sterling Oil Co.; capital stock, \$50,000; incorporators, George A. Henderson, M. L. Bateson and C. F. Smith.

Denver, Colo.—Loveland Rubber Works; capital stock, \$10,000; to sell tires; incorporators, H. A. Donnell, C. A. Stump and B. Hansen.

Denver, Colo.—Two-Way Tractor Co.; capital stock, \$100,000; incorporators, W. Ray Drake, Ira Scott and C. L. Bishop.

Denver, Colo.—Merchants Auto Dispatch & Transportation Co.; capital stock, \$50,000; incorporators, Harry G. Ferguson, Ida M. Ferguson and Robert L. Meyers.

Recent Incorporations

Denver, Colo.—Mountain Motors Co.; capital stock, \$50,000; to distribute cars; incorporators, S. N. Hicks, Bert Williams and C. H. Hanington.

Denver, Colo.—Lexington Colorado Auto Co.; capital stock, \$15,000; to distribute cars; incorporators, D. E. Trogler, J. H. Naylor and W. Vickerman.

Dover, Del.—Lewis Motor Corp.; to manufacture motors, motor cars and engines; capital stock, \$500,000; incorporators, F. D. Buck, George W. Dillman and M. L. Harty.

Des Moines, Iowa.—Iowa Tire Co.; capital stock, \$15,000; incorporators, R. A. Morton, S. C. Williams and Ralph Law.

Dubuque, Ia.—Bolsky-Cook Motor Co.; capital stock, \$50,000; incorporators, Charles J. Bolsky, Lester Cook and J. M. Bolsky.

Huntington, W. Va.—West Virginia Motor Car Co.; capital stock, \$25,000; incorporators, J. C. Hamman, M. F. Dwyer, John S. Sheppard, J. G. Smith and S. S. Spencer.

Kansas City, Mo.—Elyan & Bretting Motor Co.; capital stock, \$5,000; incorporators, M. A. Flynn, George T. Bretting and J. F. Flynn; to buy and sell motor cars and deal in accessories and repairs of all kinds.

Kilbourn, Wis.—Marshall Mfg. Co.; capital stock, \$25,000; to manufacture tools, street sweepers, etc.; incorporators, F. H. Marshall, H. H. Bennett and C. M. Morris.

La Grange, Texas.—Texas Motor Co.; capital stock, \$10,000; incorporators, H. H. Ford, P. L. Davis and E. C. Gullmarlin.

Lexington, Ky.—Two States Motor Co.; capital stock, \$10,000; incorporators, J. W. Crutcher, A. V. Combs and Nall Combs.

Lexington, Ky.—Central Auto Co.; capital stock, \$5,000; incorporators, A. S. Foley, William Gum and W. C. Griffin.

Madisonville, Ky.—Ross Garage Co.; capital stock, \$5,000; incorporators, Claude L. Ross, Ellen P. Ross and James B. Ross.

Madison, Iowa.—Madison Auto Supply Co.; capital stock, \$25,000; incorporators, T. R. Smith, R. E. Smith and A. W. Smith.

Milwaukee, Wis.—The Edgar F. Sanger Co.; capital stock, \$25,000; to deal in new and used cars, operate garage, etc.; incorporators, Edgar F. Sanger, E. G. Wurster, Glenway Maxon and A. Borst.

Milwaukee, Wis.—AI Trucking Co.; capital stock, \$10,000; to sell and operate trucks; incorporators, George C. Holmes and Wm. J. P. Aberg.

Milwaukee, Wis.—Milwaukee Auto Painting Co.; capital stock, \$5,000; incorporators, Donald C. Harbee, H. O. Wolfe and M. Horth.

Milwaukee, Wis.—The American Safety Signal Co.; capital stock, \$10,000; incorporators, H. W. Monerow, Charles Mangel and Nels Nelson.

Raleigh, N. C.—Corbett Motor Truck Co.; capital stock, \$10,000; incorporators, R. J. Corbett, A. Cooper, J. D. Cooper, A. A. Zollicoffer, and others.

Sedro-Wooley, Wash.—Starr Motor Truck & Tractor Attachment Co.; capital stock, \$25,000; incorporators, C. E. Starr and John A. Thompson.

St. Joseph, Mo.—Trachsel Motor Car Co.; capital stock, \$10,000; incorporators, G. E. Myers, J. E. Myers, R. S. Trachsel, C. P. Jamison and G. Burger.

Tulsa, Okla.—Purdy Motor Co.; capital stock, \$30,000; incorporators, R. M. Purdy, I. M. Smith and Albert H. Bell.

MOTOR AGE

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February 8, 1917

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"NORMA" BALL BEARINGS (PATENTED)

As car manufacturer or dealer, what you really
sell is service, embodied in more or less de-
gree in your car. As car owner, what you have
really paid for in the car you bought is serv-
ice, in more or less degree. And that service
is largely determined by the service quality of
the magneto, the lighting generator, the start-
ing motor.

The magnetos known far and wide for
their service-giving capacity—the light-
ing generators and starting motors ev-
erywhere recognized for dependability
of service — all are fitted with
"NORMA" Bearings. Why? Because of
the superlative capacity of **"NORMA"**
Bearings for unfailing service at high
speeds.

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trical Accessories Are
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1750 BROADWAY

NEW YORK

Ball, Roller, Thrust, Combination Bearings

To Market Pullman Cars

New Company Formed to Take Over Entire Selling End of Business

Plans Under Way to Increase Facilities of Manufacturing Concern

YORK, Pa., Feb. 6.—The Pullman Motor Car Corp. has been formed in Delaware with a capital of \$250,000 for the purpose of marketing the entire output of the Pullman Motor Car Co. The latter company will continue to manufacture Pullman cars, but has turned the entire selling of them over to the newly-formed corporation.

The stock of the new corporation is held by the same interests that control the Pullman Motor Car Co. and the purpose of the selling organization is to assume all of the guarantees and financial obligations connected with the sale of the Pullman product. Existing contracts with all Pullman dealers continue as heretofore, and the new corporation will maintain all of the guarantees on all Pullman cars sold in the past as well as in the future.

During the last year the business of the Pullman Motor Car Co. approximated \$4,000,000, which was done on a capital of \$500,000, which was quite inadequate for such a total of business. Plans are under way for an increase of capital to provide sufficient working funds and for an increase in factory facilities.

With the resignation of H. W. Hayden, vice-president and general manager, the internal organization of the manufacturing company has been entirely reorganized under a committee system of department heads. The sales and purchasing departments are under the general supervision of A. B. Cosgrove, formerly sales manager; financial department under H. P. Jones, former secretary and treasurer and a stockholder; and service and stock under S. L. Fuller, formerly service manager.

Increased finances will be controlled by the present stockholders who are largely businessmen of York and eastern Pennsylvania. J. C. Smith, formerly chairman of the board of directors, is president of the Smith-Ault Reaper Co., and director in many public utilities in eastern Pennsylvania. Geo. H. Schmidt, his brother, is a corporation lawyer. Carlton Hoff is production manager of the American Chain Co. W. A. Keyworth is president of the First National Bank, York. J. E. Baker is a large coal and limestone operator. The company will bring out in a few weeks a new six-cylinder model at medium price.

MEDIUM-PRICE FIAT COMING

Poughkeepsie, N. Y., Feb. 5.—The F. I. A. T. Co. will invade the medium-priced field as soon as peace is declared, according to J. S. Josephs, of the American company,

who arrived Feb. 1 after a trip to the factory of the parent Fiat company in Turin. As soon as the war is over, the Fiat company will enlarge its Poughkeepsie plant to nearly ten times its present size and will produce on a large scale a car selling around \$2,000. The arrangements for building a medium-priced car will not mean the discontinuing of the higher-priced models.

Mr. Josephs, who was formerly treasurer of the company, is now in charge of American manufacturing and sales. The Italian company recently acquired control of the American factory, buying all of the stock of the Poughkeepsie factory except that held by Mr. Josephs.

VELIE PRICES UP AGAIN

New York, Feb. 5.—The Velie Motor Vehicle Co. will advance its prices \$50 on March 1 on all its open cars. On that date the following prices will prevail: model 28, five-passenger touring, \$1,185; with detachable sedan top, \$1,385; four-passenger companionable roadster, \$1,185; two-passenger roadster, \$1,165; model 27, seven-passenger six, will sell for \$1,650. The closed body types are the four-passenger coupe at \$1,750, the touring sedan at \$1,635, and the town car at \$2,250.

ANTI-THEFT BODY SUCCESS

Kansas City, Mo., Feb. 3.—The Anti-Motor Thief Association, organized in Kansas City more than a year ago, will hold an annual election of officers Feb. 22, in preparation for which a membership campaign has been started. The association was promoted by the Kansas City Automobile Club, which is still the leading factor in it. Directors of the association are now enlisting the coöperation of various civic bodies, representing the work as one in which each line of business, and each society, should take official part. Frank E. Lott, president of the association; Oliver Wroughton, E. B. Murray and Edwin Cammack, directors, are speaking before the civic bodies and securing appointment of representatives to act on the central board of the association. The responses to the appeals have been liberal.

The Anti Motor Thief Association has made good. It issues a shield for attaching to members' cars—and these shields have actually protected the cars from theft. In January there were fifty-two thefts of motor cars in Kansas City, the largest number in any month since licenses were issued in Kansas City. But only one car of a member was stolen in the past year.

The association is also asking the support of organizations for the bill in the state legislature, requiring that the license be shown when a car is sold, and imposing heavy penalties on the purchaser, as well as the seller, of a car disposed of without such showing. The association is coöperating with the parole board, no paroles of motor thieves being granted without its approval—and they are few.

Motor Laws Are Broad

Arizona Legislature Will Act on Several Measures Affecting Motorists

Width of Tires Permissible and Right of Way Considered

PHOENIX, Ariz., Feb. 2.—Several important measures affecting motor vehicle owners and governing traffic on the highways of Arizona are now pending in the third state legislature. Two measures have already been introduced, one in each branch of the legislature, providing that all vehicles other than motor cars, bicycles and motorcycles shall display a white light on the left side. One of these measures provides that such lights shall be visible for 200 ft. from the front, left and rear. The bill further provides for red tail lights on bicycles as well as motorcycles, and specifies that all motor car headlights shall be visible for 500 ft., and the rear light for 200 ft., with the number plainly visible at a distance of 50 ft. from the rear. The period during which lights are to be lighted is from half an hour after sunset to a half hour before sunrise.

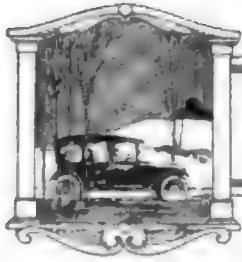
Another bill of interest to motorists is one defining the right of way at intersections, and providing for the operation at all times of the right-hand rule, that is, the vehicle approaching from the right hand of the driver to have the right of way over the vehicle so approached. Arizona has no such provision in the state laws as to the rules of the road, and several serious accidents have occurred recently from the failure of motorists to have a clear understanding of the right of way rule.

Width of Tires

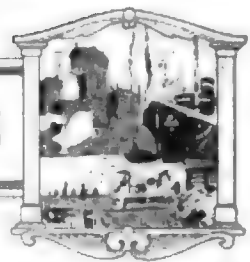
Another bill of importance to the motorist in Arizona and especially to the tourist is a measure regulating the width of tires on all vehicles except motor vehicles. The bill provides that all vehicles used for hauling loads outside of incorporated cities and towns shall be equipped with wide tires, and fixes the width of the tires at from 2 to 4 in. in width. The act is to become effective Jan. 1, 1919, in case it becomes a law.

Two of the bills now before the Arizona legislature provide for permanently dimmed headlights on motor cars, and one provides that the rays from all headlights shall strike the ground not more than 75 ft. from the machine.

It is expected that before the end of the session a bill will be introduced taxing motor cars by weight instead of by the present system of arriving at the license tax. Under the existing statute, the license tax is based on the horsepower of the machine, as fixed by the N. A. C. C. rating.



EDITORIAL PERSPECTIVES



Gasoline and Porterhouse Steaks

THERE has been much agitation in some states for state laws designed to provide some standard of quality for motor fuels and bills have been introduced into the legislatures to prohibit the sale of a fuel as gasoline which does not come up to some specified requirements—usually based on the specific gravity. That there is little value in the gravity test of a fuel as a determination of its quality is conceded by all who are in touch with the facts. The temperatures at which its portions change from a liquid to a gas—that is, its vaporizing points—are more nearly a measure of its availability in an engine. The Bureau of Standards and the Bureau of Mines in a conference last week in Washington made this plain.

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IT is doubtful that any legislation designed to standardize or define gasoline at this time would give the results anticipated by its proponents. To prohibit wholesalers or retailers from selling any fuel which tested below a certain Baume gravity would not assure motorists that they were getting fuel of the proper

volatility and proper inherent power capabilities, but it would reduce the salable supply and thus increase the price.

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IF the volatility were made the basis of the standard, it would assure a proper fuel, but would have to allow very wide limits. Otherwise, refiners, wholesalers and retailers would be forced to ask a much higher price.

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YOU can compare the crude oil with a steer. If the butcher was prohibited from selling as meat anything but the porterhouse, our meat would come very high, because the porterhouse would have to pay for the waste of all the other usable meat on the animal. If garagemen and filling stations could sell only the high-grade gasoline, their customers would have to help pay for all of the other usable fuel in the crude, much of which at present is used in increasing the quantity of the gasoline, though, to an extent, decreasing the quality.

Buyer Dictates to Maker

IT is just as true to state that the buyer dictates to the manufacturer as to say that the boy is father of the man. The motor car owner does dictate to the car maker and to the accessory maker, in fact, very frequently the car maker gets all of his suggestions from the buyer and the accessory maker gets his ideas of what new accessory he should manufacture from a letter written him by car owners, or tips dropped in conversation with car owners.

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ACCESSORY and car makers can each week get some good tips as to what accessories are useful from the Reader's Clearing House pages of MOTOR AGE. Questions of all kinds are answered in these pages. They are brim full of ideas for accessory men and quite often contain suggestions that the car maker can follow to advantage.

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HERE is an example: Some months ago a car owner wrote MOTOR AGE regarding the difficulty of re-painting his car. He had to buy several different kinds of paint and varnish. Very little of some of these paints was needed, the quantity being so small that it was difficult to buy so small a quantity. A MOTOR AGE reader suggested the idea of some manufacturer marketing a special paint box, if the phrase may be used. The idea was to put up enough of the different kinds of paints and varnishes to repaint a car. Put them all up in one case and in about the correct quantities. One manufacturer took the hint and has for some months been meeting with a good market in selling these re-paint boxes. It costs less than one-half as much to re-paint with one of these special boxes as it did when you had to buy the different paints in quantities.

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WHAT has happened with the paint boxes can happen with a dozen other accessories. The man owning the car and caring for it generally has better ideas of those accessories he needs than the so-called factory man who must perforce design and manufacture something new in order to make a living. MOTOR AGE welcomes all suggestions from readers. It hopes that the buyer will give more suggestions not only for new accessories but suggestions as to how existing ones could be vastly improved.

Speedway Autocrats

CONGRESSMAN Clifford Ireland of Peoria, Ill., who also is a member of the Contest Board of the American Automobile Association, uttered some harsh yet pertinent words at the speedway dinner at the Chicago Automobile Club last week. Congressman Ireland has been a member of the Contest Board for several years. He has been at nearly all of the speedway meets and knows the in's and out's of speedway racing. He hit the nail straight on the head when he said that speedway managements are largely responsible for the troubles that have followed speedway racing. There is, according to him, only one speedway that is well managed and that one is located in Indianapolis.

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THE Contest Board of the A. A. A. sends one of its representatives, very frequently one of its members, to speedway races. This member arrives a week before a big race. He finds something wrong, every safety precaution has not been looked into and he recommends it being done. The speedway objects, talks about its terrific investment and points to all that it has done. As a result too often the board representative gives in. If he holds out it may mean cancelling the sanction. That means calling the races off. That means that a million-dollar investment is being killed. As a result the work is slighted and something left undone that should have been done.

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THE members of the A. A. A. Contest Board need to stiffen their backs a little in 1917, or if they cannot do that, then they had better stay at home and send someone who can. A Contest Board representative goes to a speedway race as an official and not as a spectator to wear a badge and parade on the track. There are still many people who have not yet grown old enough to distinguish between wearing a badge and being a real official. A stiffer hand is needed by the Contest Board for this year. The new rules give the drivers better protection in the matter of prize money, but better protection is needed with regard to race details. The Contest Board representative should visit each track at least one month before the day of the race. If any repairs or changes have to be made they should be made at that time. If the race has to be called off that is the time to do it and not the day before the race.

Many Sales Consummated

Chicago Show Brings a Big Wholesale Demand for Motor Cars

Country Districts to Be Big Factors in Year's Business

CHICAGO, Feb. 3.—One gets the impression after talking with many of the exhibitors at the Chicago show that since everyone, or most everyone, says this has been the biggest and best show ever held in Chicago that it must be true. On every hand one hears that business has been good, far better than was expected. For some it was the wholesale sales and for some retail, while many found both the wholesale and retail sales all that was expected and more.

Chicago has been a hotbed of dealers and distributors from every part of the country during the last week. Also there have been thousands of interested buyers, although the geographical location of the western metropolis and the territory it serves is such that retail sales in winter cannot be expected to come up to those of the warmer months. In this is found the reason for better wholesale sales of cars at the show this week. People from the rural communities have gotten record prices for their farm produce, hogs, cattle, etc., and country banks' deposits have swelled to proportions not known before for many years. Hence, the farming community becomes a potential force in the buying of cars. However, the farmer is not ready to buy his car just yet; he is waiting for spring. He came to the Chicago show to see what the season had to offer. More often than not he found his local dealer here, too, and the local dealer, having his finger on the pulse of the consumer, naturally has looked to his requirements of the coming year and this has augured well for the distributor.

Business Better Than New York

While not every exhibitor agrees on the point, the majority vouch for the fact that the business done at the Chicago show is greater as a whole than that done at the New York show. Not infrequently the writer was told that it seemed from the prospects gleaned at this year's show that it would more likely be a question of getting cars fast enough, rather than getting orders. Some sales of cars at wholesale were made contingent upon the ability of the factory to produce sufficient quantity to take care of retail orders.

Another thing which demonstrated itself at the show is that the interest is more and more for the higher-priced cars. Then, again, the varied colors exemplified in body and upholstery this year as never before has struck the chord of desire for a distinctive car, one that is not just like the other fellow's machine, and the diversity

of color schemes that marks this year's production of cars is a factor in selling and a larger one than most people will believe. With cars it is very much like people; we can not make ourselves like everyone, nor can we make ourselves like every car. It takes all kinds of people to make a world and it takes all kinds of cars to satisfy a fastidious public. We have become so used to somber colors in motor cars that we have developed a very conservative estimate of what color a car shall be. To some the new colors did not appeal, but to just as many others it did, and it sold cars, too.

The biting cold of Chicago's 10-below-zero weather did not have any appreciable effect on the attendance at the show. While it is admitted that the attendance figures did not quite come up to last year, it is felt that there was a much larger percentage of real car buyers this year than last. There was seldom a time when it was easy to get around a car in any exhibit this year. People seemed to become transfixed when they got to the rail that protected a stripped chassis or a cutaway engine. The writer watched one interested crowd around a certain display and for fifteen minutes those at the rail did not move. Of course, some were just curious, but there were many who appeared to be real buyers.

Dealers, distributors and factory men met at the banquet board all through the week, and this applied to almost every car make. At these banquets were dealers from every part of the country here to see the newest in car offerings for 1917.

BIGGEST TRACTOR SHOW PROMISED

Kansas City, Mo., Feb. 6.—The annual tractor show which will be held in this city the week of Feb. 12 to 17, promises to be the biggest of the kind ever held. It will be held in a large tent as last year and large show space has been provided.

A feature of the week will be the part the Society of Automotive Engineers plans to take. Wednesday will be S. A. E. day at the tractor show and in the evening will be held a tractor supper at Hotel Baltimore. It is planned to have Governor Capper as speaker and to have President Dunham of the S. A. E. talk on standardization work. Kansas City is recognized as the largest tractor show of the season and is to the tractor industry what the New York and Chicago shows are to the motor car trade.

FARMERS STUDY TRACTORS

Madison, Wis., Feb. 5.—The college of agriculture, University of Wisconsin, is conducting the second annual Wisconsin gas engine and tractor school for the farmers of the state, during the week of Feb. 5 to 10. The school is in charge of F. M. White, head of the department of agricultural engineering and the equipment includes more than twenty types of gas engines and six makes of widely used farm tractors, together with the facilities at hand in the machine shops of the agricultural engineering department.

The 400 Visit Salon

Buyers of High-Priced Cars Bring Success to Second Venture

Quarters at Congress Re-Leased for Next Year

CHICAGO, Feb. 3.—Good business was done at the second motor car salon held in the Elizabethan room of the Congress hotel all of last week. Compared with last year the show had an increase in attendance of 500 per cent, and approximately 12,000 people attended during the week. The dollar admission was intended to keep the crowds out, the show working on the assumption that it is better to have a few real buyers who want a chance to see the show than a mob of those who cannot purchase a high-priced car.

With this object in view the management had distributed engraved invitations among the exhibitors and they in turn had carefully distributed them among their prospects. The result was that many people were in attendance representing Chicago's 400 who never go into a salesroom along Michigan avenue, and could not be gotten into the Coliseum. It is because of this peculiar situation that the salon show is certain to be a good success.

So satisfied was the management with the last two shows that contract was made and deposit placed for the Elizabethan room for 1918. It is hoped by that time to have increased the available space. Practically all of the space has already been contracted for, which is similar to New York where the 1918 salon in the Hotel Astor practically all has been taken.

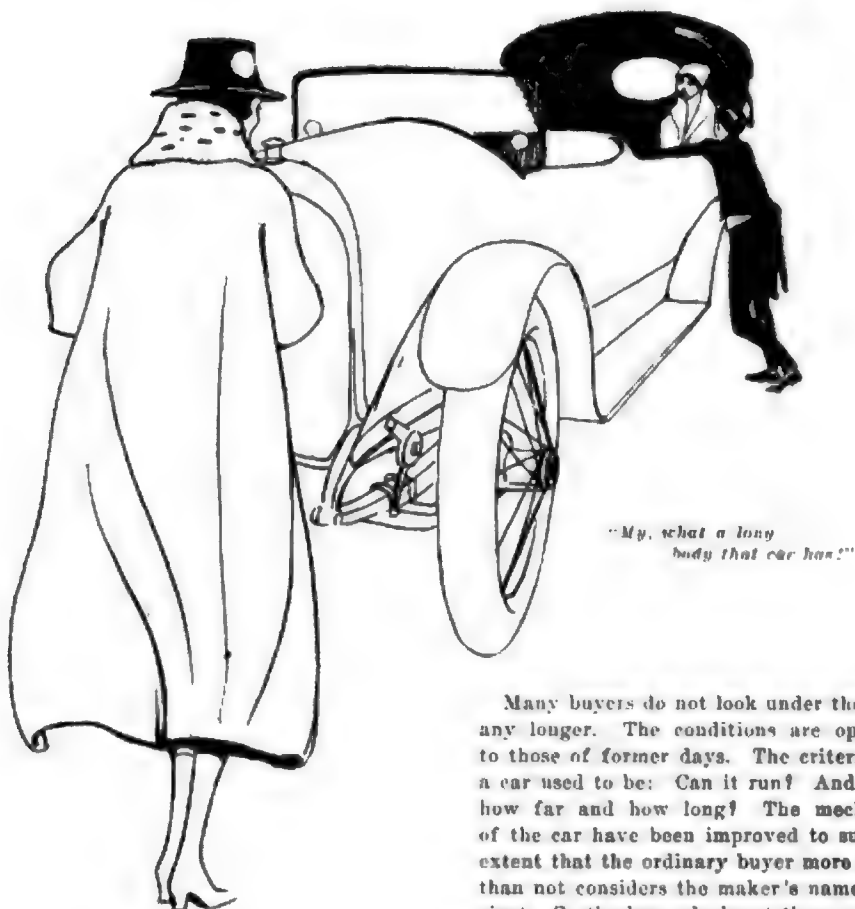
There was good business with all exhibitors and while sales were few inquiries were good. Louis Disbrow, showing his new racing car, stated to-night that he has contracted for over 170 cars wholesale through dealers and made seven individual sales. C. P. Kimball & Co., local body builder, reported more inquiries for custom-made bodies than a year ago. The White Co., which has been in the salon in New York and Chicago for the last two years, has made more individual sales at the salon than at the big show. Locomobile entered the New York and Chicago salons this year for the first time and was well pleased. The new Fageol was well received and several individual sales made.

RICH TOOL BANQUET

Chicago, Feb. 2.—One of the most elaborate of the dinners and entertainments in connection with the Chicago show, was the banquet of the Rich Tool Co., last night at the Hotel La Salle. A feature was the presentation to each of the sixty guests with a silver belt buckle carrying each guests' initials in monogram.

Comfort Makes the Car Go

From the Woman's Viewpoint



THE maker recognizes the woman as a factor in the production of his car. He heeds the complaints of the woman motorist and tries to make driving as easy for her as possible. If she prefers variety—which she does, evidently—he provides opportunity for choosing in options of color, of upholstery and equipment. If she complains of the cold in the winter—which she does, naturally—he provides heating facilities. If she still finds driving hard in spite of the starting systems—which she does, usually—he provides for changes in the mechanism of his car.

Many Body Designs

The Willys Overland Co. line of cars contains twenty body designs. The Crow-Elkart Motor Co. offers ten different color options and three upholstery options. The Premier, McFarlan, Pullman and Owen Magnetic have done away with gear shifting. Many makers give the buyer opportunity to have the special job body to suit individual preferences. The interior of the tonneau has become smoother and more sightly in cars in general. Deeply carpet lies smoothly under foot. Additional seats fold into small recesses, leaving no trace behind them. Thought is given to detail.

Many buyers do not look under the hood any longer. The conditions are opposite to those of former days. The criterion of a car used to be: Can it run? And if so, how far and how long? The mechanics of the car have been improved to such an extent that the ordinary buyer more likely than not considers the maker's name sufficient. So the buyer looks at the car body, and since it is the woman who more quickly discovers the lack or presence of comfort in the car body, it is from her that many of the comfort details have arisen.

What Selection Considers

The selection seems to depend on size, body design, seating arrangement, ease of riding, quietness, flexibility and power. A woman wants to be carried with ease, safety and quietness, and nothing smacking of luxury and comfort in their highest sense is at all out of the way.

Dealers have turned their attention to body building. During show week, one of Chicago's dealers, C. H. Foster, had what he calls Opera bodies on display at his showroom. The colors are hand-mixed in the body shop; the upholstery fabrics are woven to order. Old rose and gold fabrics are used in one job. Silk pillows match the upholstery. The top lining is of gold cloth. Hand painted rose panels, gold plated fittings and silk Oriental rug and foot pillows complete the interior.

As for the little things—the White company now uses a gold medallion with the image of St. Christophe, regarded in Europe as the patron saint of motorists, on vanity cases and smoking sets in all in-

closed cars. And these are some of the things that count with the woman, some of the things that attracted her attention at the Chicago show last week.

Suppose we go back to the show for a few minutes and look at it from the woman's viewpoint.

Some Would Unite Comforts

"I come to inspect the car; not to buy it," she said. "For I am merely looking and am not in the market for a car just now."

As she spoke she raised her lorgnette, than which there is no better subduer, and glanced gingerly into the interior of the inclosed car. She did not care much for it. She tried the doors to see if they would open. They would. She even was persuaded to enter therein and sit thereon. The result brought no audible disapproval. Then she wanted to know:

Why didn't it have the two cabinet compartments with locks like those the Packard had?

Why, if it didn't have these, didn't it have some like those the Stutz had?

Wan't it possible to build them all with a chest of cabinets such as that in the four-passenger roadster shown by the Paige people?

Was it better to have the front seat in a different finish when the interior was finished so delicately?

What was the wheelbase?

If the wheelbase was that long, wouldn't it be hard to turn the car?

Wheelbase and Ease

Oh, then if the long wheelbase made riding easier, why didn't all cars have it?

What did he think of the victoria top with individual tonneau windshields such as the Reo had?

If this car wasn't like the Packard and the Pierce-Arrow and the Stutz and the Reo, why wasn't it? Yes, she would leave her address.

She was the one who made a business of getting all she could out of the show, and she was used to asking questions and having her questions answered. Her successor was a woman who didn't say anything. She merely looked and listened. She, too, tried the doors and sat briefly within. When asked if she wished attention, she smiled and shook her head. But she seemed to understand that this car was different from others because of its maker at least. She looked into the other models in the exhibit also. Finally she, too, went on. She did not have a lorgnette.

Others there were who came and went, some but to inspect the car, not to buy it; others to make appointments for demonstrations, not to inspect; and others to do

both. Through it all the attendants attended, and smiles were considered part of the decorative scheme.

The days told similar stories. Well-thought-out talks brought rewards sometimes, and sometimes no apparent success was made.

But the woman who made a business of getting all she could out of the show didn't come back or call up. She who wanted no attention called up the agency and gave her address. She had visited the exhibit but had not made herself known.

"Will you please send one around?" she asked.

Which goes to show you can't always sometimes tell just how the show works its wonders.

Roadsters Are Popular

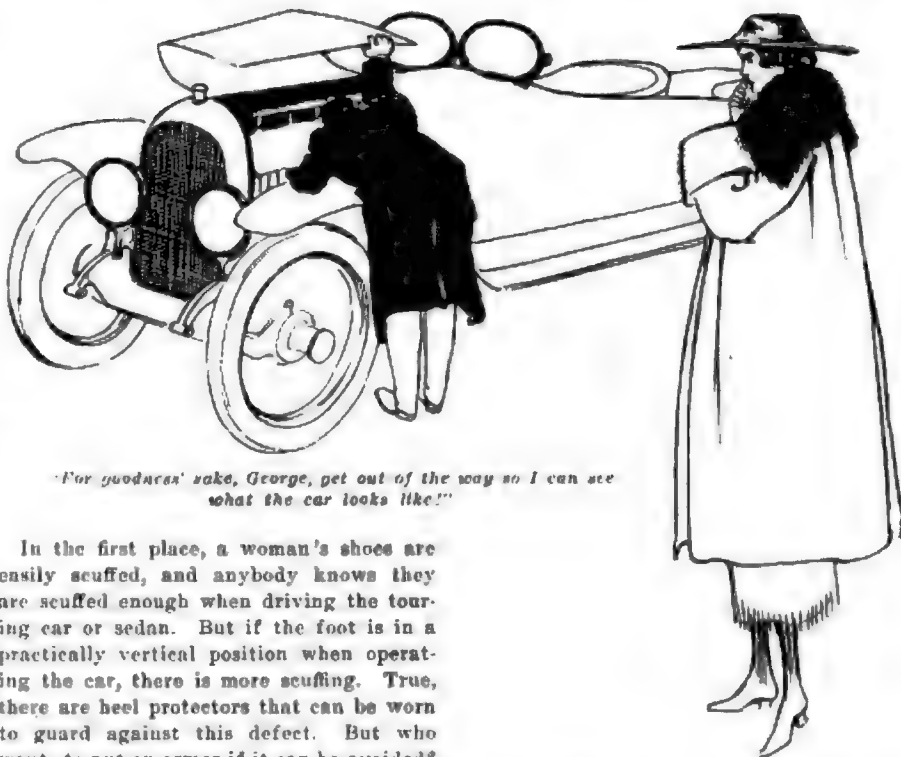
About half the exhibitors showed four-passenger roadsters. This type of roadster apparently has taken the lead over both two-passenger and three-passenger. It is a matter of efficiency to exaggerate the cloverleaf to make four ride where three rode before; so the makers cannot be doubted in their wisdom of making this change. The exaggerated cloverleaf, however, too often has not enough leg room even for the smaller of the species, and for this reason is not as comfortable as it might be. Also, the two-passenger seat in the exaggerated cloverleaf is apt to be discouraging of that fourth passenger, crowding somewhat when the fourth is present.

The four-passenger has the advantage of being particularly suited to the woman driver. She feels more confidence when driving the lower, shorter car. For this reason, it is a pity that the four-passenger cannot have all the comforts of home and the larger cars, as it is not chosen sometimes for these reasons.

Comfort Plus Looks

The new Paige convertible four-passenger roadster deserves particular attention because it combines so many qualities of comfort with those of looks and use. The rear seats are emphatic with comfort. A cabinet arrangement in the back of the front seats can be locked to hold countless accessories of the passengers. There is plenty of leg room. The job has the attraction of novelty. The only objection many women would be likely to find to it would be the nature of the top—a canopy such as is associated with less desirable vehicles—and this top, as it happens, is an important item in the roadster.

Another tendency apparent at the show—a tendency that may keep the roadster from becoming as popular with the women in its clientele as it might be—is that of making the roadster too much like the racer. The racer has a place all its own, and the roadster should have a place all its own. When the seats of the roadster are reduced almost to floor level it loses its place somewhat by taking part of that of the racer. No woman can drive a roadster in which the foot brakes are on a level with the seats and do it comfortably.



"For goodness' sake, George, get out of the way so I can see what the car looks like!"

In the first place, a woman's shoes are easily scuffed, and anybody knows they are scuffed enough when driving the touring car or sedan. But if the foot is in a practically vertical position when operating the car, there is more scuffing. True, there are heel protectors that can be worn to guard against this defect. But who wants to put on armor if it can be avoided?

"I can sit on the floor at home," one woman said.

New Gearshifts Mean Much

The new gearshifts are a godsend to the woman driver. First it was cranking that prevented so many women from driving. Then it was gearshifting. Now that several exhibitors have set the pace, this last also may be done away with. Perhaps some other general difficulty in driving will become the topic, but it is not apt to be so large a topic as that of cranking and gearshifting.

The Owen Magnetic, McFarlan, Pullman and Premier had their own reasons for the attention they drew. In them is one of the possessions of the electric which have brought to that vehicle the preference of many. Given a self-starting car with the press-the-button ease of changing gears and the demountable rim with its attendant long-handled jack, little tax on the strength of the woman driver is levied.

How They Are Done

Premier, Pullman and McFarlan gear shifts are operated by push buttons within easy reach of the driver's fingers. The Owen Magnetic has a lever which is moved according to a charted steering wheel to produce the desired effect. All three have ease of operation as their main argument.

However, the usual means of changing gears have been improved much over those of several years ago. Drivers comment on the added ease as compared to former days, and yet the occasional woman driver in what might be called the pioneer days objected only to the difficulty of cranking.

"I'd rather shift gears than eat," is one extravagant remark heard at the show.

Observation leaves one with some doubt as to whether the woman really does pre-

fer the closed car to the open car, as she is supposed to do. Without doubt the closed car has brought that ease and luxury that were impossible in the open car with its wind-blown locks, heavy wraps and general disheveling. Taken as a whole, the open car was more in prominence at the show than the closed car. This was due to a large extent to the possession by the 1917 open car of many features for long exclusively those of a closed car.

The woman finds the deep-pley carpet, the neatly plaited upholstery, the color in the open car as well as in the closed car. A hassock rests on the floor of the tonneau. Pockets give space for storing small belongings. The tonneau windshield protects her from the full strength of the elements. Curtains on occasion transform the open car into a very comfortable closed car.

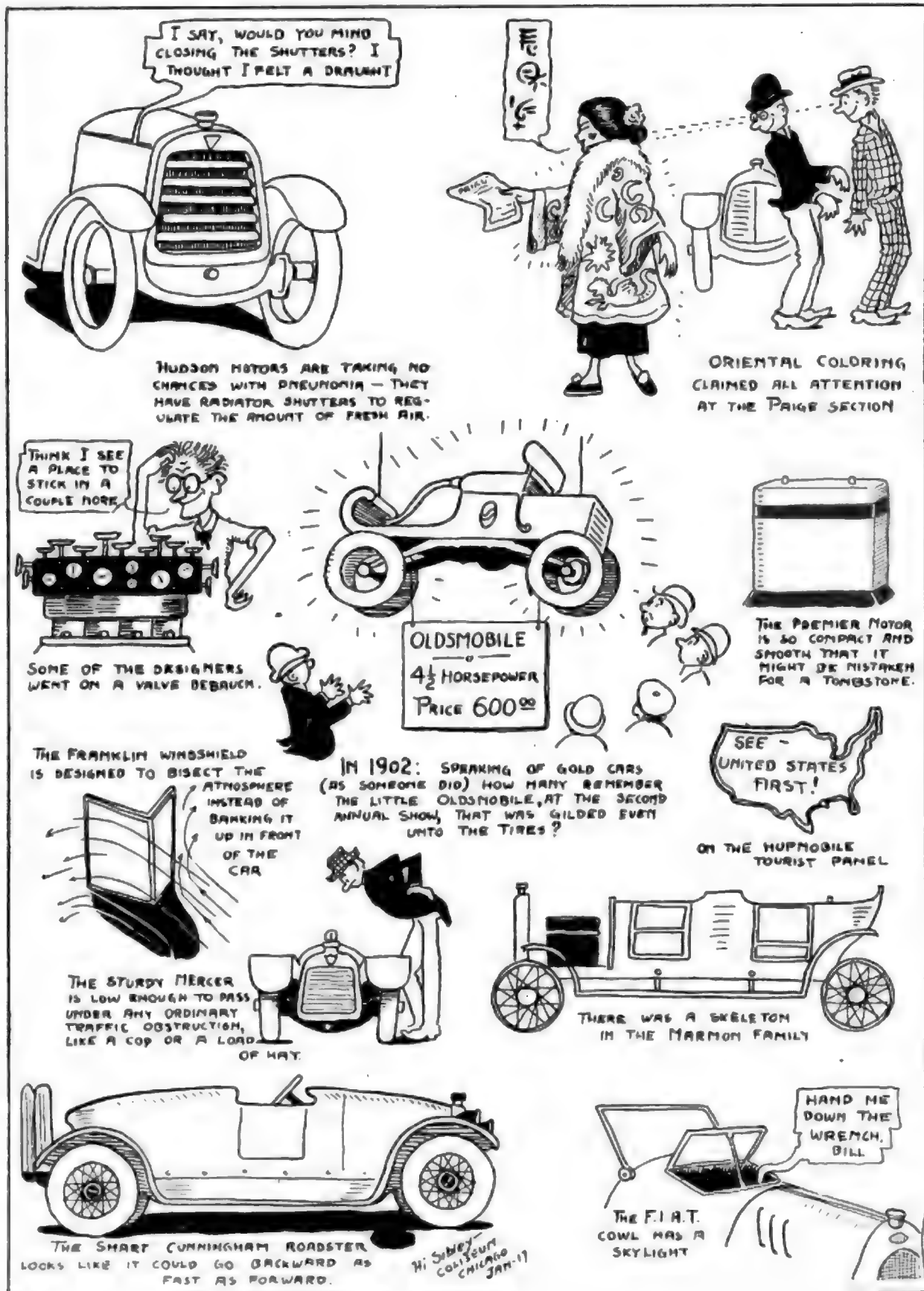
Color Takes Fancy Often

The color attracted many last week. Strange to say, it was not always the most intense color. The dull finish, battleship gray of several models on display had the preference among feminine visitors.

Greens were prominent, as were yellows. Blue and red also were present. These colors are in stock jobs as well as in specially built exhibition jobs. And no matter how bright the color is, it is always kinder than the old red plush of the first de luxe cars. The woman well remembers the red plush, for, like the railway coach on a hot summer day, its memory was practically indelible. Many a woman motorist of not so many years ago arrived at a party on a rainy night to find that a chance leak in the none too tight top and sides had left by way of the red stain route.

This, however, was only one of several
(Continued to page 41)

Hi Sibley's Pen Interprets Chicago Show Features



Vacuum Feeds at Law

Stewart-Warner Company Sues Two Concerns on Tank Patents

Heco and Sparton Systems Are Under Fire

CHICAGO, Feb. 3.—The Stewart-Warner Speedometer Corp. yesterday filed suit in the United States District Court of Chicago against the Sparks-Withington Co., Jackson, Mass., and another against the Heinze Electric Co., Lowell, Mass., claiming violation of patents covering the vacuum-gravity system of gasoline feed to the carburetor. When the Stewart-Warner Co. first produced the vacuum tank, it secured the Webb Jay patent covering it and has grouped other patents around it.

The two systems against which the suits are directed are the Sparton and the Heco, which were presented to the public for the first time at the New York show, and these suits represent one of the quickest legal actions that the motoring industry has witnessed. Stewart-Warner interests hold that any fuel feed system claiming to operate on the vacuum principle is an infringement of patents it controls and will be prosecuted.

KANSAS CAMPAIGNS FOR ROADS

Topeka, Kan., Feb. 5.—J. Frank Smith, president of the Kansas Good Roads Association, has shown that the association has a very carefully prepared campaign outlined for improving the roads of Kansas. He recently announced the plan worked out for Douglas county, in which Lawrence, the home of the state university, is situated, and also the plan for Shawnee county, holding Topeka, the capital. These plans hold up an alluring picture of the vast commercial gain and social advantages of a complete road system, and show how easy it would be to get it. The association is working first for suitable laws, and is also arousing the necessary enthusiasm in advance, for taking advantage of the state laws when enacted. It is notable that the interests of the rural districts in the counties are considered quite as much in the announcements, as the desires of the cities.

PENNSY MOTOR LAW AMENDED

Harrisburg, Pa., Feb. 2.—Amendments to the general motor vehicle act of 1913 in this state will be limited to one addition for car owners this year; every operator will take an examination and must have a driver's license.

No longer will cities make or enforce their own regulations or boroughs enact their own ordinances concerning the speed and conduct of cars on their streets. The highway department, which has brought

these amendments before the legislature now in session, proposes to wipe out all existing community legislation on the subject and to impose a uniform set of regulations.

By the new law the dealer's fees are increased from 10 to \$15; the power of headlights fixed, and light is forbidden to rise above 42 in. from the surface on which vehicle stands, the horn-blow sign provision is eliminated, and exceeding of 24 m.p.h. is to be prima facie evidence of recklessness.

No license will be valid under the new law until the driver's signature and photograph is attached.

One effect of the amendment will be the elimination of pull now exerted so effectively in behalf of owners who happened to be arrested. The new amendments provide that all information for offenses committed by car owners or users shall be brought under the act of assembly, and not before a magistrate or justice of the peace. They make a violation a misdemeanor, whereas in a great many cases at present drivers are merely called to answer to a charge of breach of police regulations or of a city ordinance.

DELAWARE PLANS EXTENSIVE

Wilmington, Del., Feb. 2.—The promised offers to straighten out some kinks in the Delaware motor law—which has the backing of former Governor Charles R. Miller, whose term expired two weeks ago, and the Delaware Automobile Association—took definite shape this week, when there were introduced in the Legislature ten bills all looking toward that end. Briefly their provisions are as follows:

Requiring every motor vehicle to be provided with good brake and horn, bell or other signal device; requiring all operators, except drivers of ambulances and fire department vehicles, to have state licenses; limiting fines, where a plea of guilty of violation of the motor law is entered, to \$1, and to \$3, where conviction is secured, also providing that all fines shall go into the county road fund; protecting from penalty drivers or owners who inadvertently fail to have their license certificates with them, provided proof is offered at the trial that one was possessed at the time; protecting from penalty owners from whose cars license tags have dropped or been taken without their knowledge; increasing the penalty for driving off motor vehicles up to a minimum of \$100 with a maximum of \$300, with imprisonment up to two years, in the discretion of the court; exempting from taxation as personal property any licensed motor vehicle; requiring the use of mirrors, so as to see traffic following; requiring all vehicles other than motor vehicles to carry one white light at night, visible ahead and in the rear; prohibiting the use of dealer's tags on jitneys and taxicabs; prohibiting any municipality passing or enforcing any law in conflict with the State motor law.

Preparedness Is Theme

Chamber of Commerce of United States Talks National Defence

Learns of Plans of Motor Car Factories

WASHINGTON, D. C., Feb. 3.—The crisis arising from the granting of the German ambassador's passports has put added emphasis on the address on "National Defense" made by Howard F. Coffin of the Naval Consulting Board at the fifth annual meeting of the Chamber of Commerce of the United States, which closed here yesterday. Mr. Coffin submitted figures about the military unpreparedness of the country which he asked should neither be recorded nor published.

A good deal of time was given to subjects pertaining to the war and its relation to trade. The importance of preparation to meet the fierce competition that will follow the war was stressed in no less a degree than the importance of preparation for probable hostilities. Closer co-operation between government bureaus, business men and trade associations in both domestic and foreign trade was urged.

One of the most important committee reports was that which considered the marvelous increase in efficiency of European nations brought out by war conditions.

Secretary of Commerce Redfield spoke on "Business Conditions," pointing out the necessity for export trade as well as domestic business. The essentials of foreign trade development, as expressed by the delegate of the American Chamber of Commerce of Paris, were said to comprise a bargaining tariff, facilitation of banking arrangements and education of representatives among other things. An address on "Education for Foreign Trade" was delivered by Wallace D. Simmons, president of the Simmons Hardware Co., St. Louis. Harry A. Wheeler of Chicago, first president of the Chamber, spoke on "Industrial Relations."

CAMPBELL LEAVES STUTZ OFFICE

Indianapolis, Feb. 5.—Henry F. Campbell has resigned as secretary and treasurer of the Stutz Motor Car Co., to devote his time to other interests. Campbell was one of the original founders of the Stutz company and retains a stock interest. William P. Thompson, who has been sales manager, succeeds him.

KENTUCKY S. O. DOUBLES CAPITAL

Louisville, Ky., Feb. 3.—Stockholders of the Standard Oil Co. voted at their annual meeting this week to increase the capital stock of the corporation from \$3,000,000 to \$6,000,000.

Orphan Car Parts Makers

The Following Is a List of 241 Cars Which Are No Longer Produced by the Original Manufacturers. Name and Address of the Concerns Which Furnish Parts

A

CAR	COMPANY AND ADDRESS
ABBOTT	Consolidated Car Co., Detroit; Puritan Machine Co., Detroit; Jos. C. Gorey & Co., New York; Abbott-Detroit Parts Corp., New York.
ACME	Puritan Mach. Co., Detroit.
AEROCAR	Auto Parts Co., Chicago; Puritan Machine Co., Detroit.
ALCO	International Motor Co., New York; Puritan Mach. Co., Detroit; American Locomotive Co., Providence, R. I.; Alco Service Co., Philadelphia; Rand & Chandler, Los Angeles, Cal.
ALDEN-SAMPSON	Standard Motor Parts Co., New Castle, Ind.
ALLEN-KINGSTON	New Departure Co., Bristol, Conn.
ALLIS-CHALMERS	Puritan Machine Co., Detroit.
ALPENA	Puritan Machine Co., Detroit.
AMERICAN	Levene Motor Co., Philadelphia, Pa.; American Motor Parts Co., Indianapolis; V. A. Longaker Co., Indianapolis; Puritan Mach. Co., Detroit; Burt Motor Car Co., Los Angeles, Cal.
AMERICAN MORRIS	St. Louis Car Co., St. Louis.
AMERICAN TRUCK	Auto Parts Co., Chicago.
AMPLEX	Gillette Motors Co., Mishawaka, Ind.
ANCHOR	Anchor Buggy Co., Cincinnati.
ANHUT	Puritan Machine Co., Detroit; Auto Parts Co., Chicago.
ARDSLEY	Ardsley Motor Car Co., Yonkers, N. Y.
ARGO	Puritan Machine Co., Detroit.
ATLANTIC	Puritan Machine Co., Detroit.
ATLAS	Auto Parts & Repair Co., Springfield, Mass.; Puritan Machine Co., Detroit; Jos. C. Gorey, New York City.
AUTOCAR	Autocar Co., Ardmore, Pa.

B

BABCOCK	Babcock Mfrs. Supply Co., Watertown, N. Y.; Puritan Machine Co., Detroit.
BADGER	Schultz & Harder, Columbus, Wis.; Puritan Machine Co., Detroit.
BARNES	Auto Parts Mfg. Co., Detroit; Puritan Machine Co., Detroit.
BARNHAM	Puritan Machine Co., Detroit.
BERGDOLL	Louis J. Bergdoll Co., Philadelphia; Levene Motor Co., Philadelphia; Jos. C. Gorey, New York City.
BERKSHIRE	E. B. Belcher, Cambridge, Mass.; Berkshire Motor Co., Pittsfield, Mass.; Puritan Machine Co., Detroit.
BERLIET	American Locomotive Co., Providence, R. I.
BESSEMER	Robt. M. Cutting Co., Chicago.
BLACK CROW	Black Mfg. Co., Chicago; Crow Motor Car Co., Elkhart, Ind.
BLOMSTROM	Auto Parts Co., Detroit; Puritan Machine Co., Detroit.
BORLAND	Puritan Machine Co., Detroit.
BRIGGS-DETROITER	Puritan Machine Co., Detroit.
BRINTELL	Puritan Machine Co., Detroit.
BROWNIER	Hinsdale Electrical B. Co., Hinsdale, Ill.
BROC ELECTRIC	Puritan Machine Co., Detroit.
BRODESSER	Puritan Machine Co., Detroit.
BRUSH	Standard Motor Parts Co., Newcastle, Ind.; Puritan Machine Co., Detroit; Davidson Repairshop, 227 West 64th St., New York, N. Y.
BUFFALO ELECTRIC	Puritan Machine Co., Detroit.

C

CALIFORNIA	California Auto Co., Los Angeles, Cal.; Puritan Machine Co., Detroit.
CAMERON	Cameron Mfg. Co., New Haven, Conn.
CARHARTT	Auto Parts Co., Chicago; Puritan Machine Co., Detroit.
CARNATION	Carnation Motor Car Co., Detroit; Auto Parts Co., Chicago; Puritan Machine Co., Detroit; K. C. Auto Parts Co., 1827 McGee St., Kansas City, Mo.
CARTER	Puritan Machine Co., Detroit.
CARTHAGE	Puritan Machine Co., Detroit.
CAVAC	Puritan Machine Co., Detroit.
CENTURY	Puritan Machine Co., 422 Lafayette Blvd., Detroit.
CHADWICK	Chadwick Eng. Works, Pottstown, Pa.
CHIEF	Auto Parts Mfg. Co., Detroit; Chief Motor Co., Detroit.
CINC	Haberer & Co., Cincinnati.
CINCO	Puritan Machine Co., Detroit.
CLARK	Clark Motor Car Co., Shelbyville, Ind.; Meteor Motor Car Co., Piqua, Ohio; Clark Auto Co., Atlanta, Ga.; Puritan Machine Co., Detroit; American Motors Parts Co., Indianapolis.
CLARK-CARTER	Cutting Motor Car Co., Jackson, Mich.; L. C. Erbes, Waterloo, Iowa; Puritan Machine Co., Detroit; Robt. M. Cutting Co., 2635 S. Wabash Ave., Chicago.
CLEVELAND	Western Motor Car Co., Cleveland, Ohio; Garford Motor Truck Co., Lima, Ohio.
COATES-GOSHEN	Coates-Goshen Auto Co., Goshen, N. Y.; Miller Car Co., Goshen, N. Y.
COLBY	A. O. Smith, Milwaukee, Wis.
COLBURN	Colburn Automobile Co., Denver, Colo.; Erickson & Stalaker, Denver, Colo.; Puritan Machine Co., Detroit.
COLLEY	Puritan Machine Co., Detroit.

CAR

CAR	COMPANY AND ADDRESS
COLUMBIA	Columbia Auto Repair Co., Hartford, Conn.; Standard Motor Parts Co., Newcastle, Ind.
COLUMBUS ELECTRIC	New Columbus Buggy Co., Columbus, Ohio.
CONNERSVILLE	Puritan Machine Co., Detroit.
CONTINENTAL	Puritan Machine Co., Detroit.
CORBIN	Corbin Motor Vehicle Co., New Britain, Conn.
CORBITT	Puritan Machine Co., Detroit.
CORREJA	J. C. Gorey & Co., New York.
COURIER	Standard Motor Parts Co., Newcastle, Ind.; Puritan Machine Co., Detroit.
COURIER-CLERMONT	Standard Motor Parts Co., Newcastle, Ind.
CRAIG-TOLEDO	A. W. Colter, Toledo; Puritan Machine Co., Detroit.
CRESCENT	Northway Auto Parts & Sales Co., Cincinnati; Puritan Machine Co., Detroit.
CRICKET	Puritan Machine Co., Detroit.
CROW	Black Mfg. Co., Chicago; Crow M. C. Co., Elkhart, Ind.; Puritan Machine Co., Detroit.
CROXTON	Auto Parts Co., Chicago; Puritan Machine Co., Detroit.
CROXTON-KEETON	K. C. Auto Parts Co., 1827 McGee St., Kansas City, Mo.
CUTTING	Puritan Machine Co., Detroit; Harris Bros. Co., Chicago.

D

DART	Puritan Machine Co., Detroit.
DAYTON	Puritan Machine Co., Detroit.
DEAL	Auto Parts Co., Chicago.
DEARBORNE-DETROIT	Hawa Motor Car Co.
DE LUXE	Puritan Machine Co., Detroit.
DE MOT	Puritan Machine Co., Detroit.
DE TAMBLE	American Motors Parts Co., Indianapolis; Puritan Machine Co., Detroit; De Tumble Motors Co., Anderson, Ind.
DRAGON	Philadelphia Machine Works, Philadelphia.
DUER	Chicago Coach & Carriage Co., Chicago.
DUROCAR	Puritan Machine Co., Detroit.

E

ECLIPSE	Kruegar Motor Car Co., Milwaukee; Frank Toepfer's Sons, Milwaukee.
EDWARDS	Edwards Motor Car Co., Long Island City, N. Y.; Puritan Machine Co., Detroit.
ELECTRIC VEHICLE	Maxwell Briscoe Motor Co., L. I. City, N. Y.
ELK	Puritan Machine Co., Detroit.
ELMORE	Auto Parts Co., Chicago; Puritan Machine Co., Detroit; Standard Motor Parts Co., New Castle, Ind.
EVERETT	Holt-Chandler, Long Island City, N. Y.
EVERITT	Maxwell Motor Sales, Newcastle, Ind.; Puritan Machine Co., Detroit.
EWING	Jos. C. Gorey, New York; Puritan Machine Co., Detroit; L. R. Ewing, Leader Bldg., Cleveland, O.

F

F. A. L.	Puritan Machine Co., Detroit; Auto Parts Co., Chicago; K. C. Motor Parts Co., 1827 McGee St., Kansas City, Mo.
FINDLEY	L. E. Ewing, Cleveland.
FIRESTONE COLUMBUS	Puritan Machine Co., Detroit; New Columbus Buggy Co., Columbus, Ohio.
FLANDERS	Puritan Machine Co., Detroit; Studebaker Corp., Detroit.
FULLER	Jackson Automobile Co., Jackson, Mich.

G

GAETH	Gaeth Motor Car Co., Cleveland.
GARFORD	Elyria Belting & Machinery Co., Elyria, Ohio; Garford Motor Truck Co., Lima, Ohio; Puritan Machine Co., Detroit.
G. J. G.	Puritan Machine Co., Detroit.
GRABOWSKY	Puritan Machine Co., Detroit; Jos. C. Gorey, New York City.
GRAMM	Garford Motor Truck Co., Lima, Ohio; Puritan Machine Co., Detroit.
GLEASON	Bauer Mch. Wks. Co., Kansas City, Mo.
GREAT SMITH	Bauer Mch. Wks. Co., Kansas City, Mo.; Smith Automobile Co., Topeka, Kan.
GREAT WESTERN	Great Western Auto Co., Peru, Ind.
GROUT	A. F. Kirkpatrick, Orange, Mass.; Puritan Machine Co., Detroit.

H

HALLADAY	A. O. Barley, Streator, Ill.; A. O. Smith Co., Milwaukee; W. J. Hurt Motor Car Co., Los Angeles.
HART KRAFT	Quincy Engine Co., Chambersburg, Pa.; Petrie & Morganhill, Greenastle, Pa.
HAYES	Puritan Machine Co., Detroit; Jos. C. Gorey, New York.
HENDERSON	Henderson Motor Car Co., Detroit; Auto Parts Co., Chicago; Puritan Machine Co., Detroit.

CAR COMPANY AND ADDRESS
HENRY—A. O. Smith Co., Milwaukee; Jos. C. Gorey, New York; Puritan Machine Co., Detroit; Muskegon Auto Co., Muskegon, Mich.
HERRESHOFF—American Motor Parts Co., Indianapolis; Puritan Machine Co., Detroit; Levene Motor Co., Philadelphia; Jos. C. Gorey, New York.
HEWITT—International Motor Co., New York.
HOLSMAN—Mercury Mfg. Co., Chicago.
HOUPP—New Departure Mfg. Co., Bristol, Conn.

I
IMPERIAL—Imperial Automobile Co., Detroit.
INDIANA—Puritan Machine Co., Detroit.

J
JENKINS—Puritan Machine Co., Detroit.
JEWELL—Croston Motor Car Co., Washington, Pa.
JOHNSON—Johnson Service Co., Milwaukee.

K
KEETON—Keeton Motor Car Co., Detroit; Puritan Machine Co., Detroit; Car-Nation Motor Car Co., Detroit.
KELLY-SPRINGFIELD—Puritan Machine Co., Detroit.
KELSEY—Auto Parts & Repair Co., Boston; Kelsey Motor Co., Hartford, Conn.
KLINE—Puritan Machine Co., Detroit.
KNON—Alco Service Co., Philadelphia, Pa.
KOMET—Elkhart Motor Car Co., Elkhart, Ind.; Keith Brothers, Elkhart, Ind.
KRALL—Puritan Machine Co., Detroit.
KRIT—Krit Motor Car Co., Detroit; Puritan Machine Co., Detroit; Auto Parts Co., Chicago; Motor Corp., Philadelphia, Pa.

L
LANDSEN—Lansden Co., Inc., Brooklyn, N. Y.
LEWIS—American Motor Parts Co., Indianapolis.
LEXON—Puritan Machine Co., Detroit.
LIBERTY—Belmont Auto Mfg. Co., New Haven, Conn.
LION—American Motors Parts Co., Indianapolis; Auto Parts Co., Chicago; Puritan Machine Co., Detroit; K. C. Auto Parts Co., 1827 McGee St., Kansas City, Mo.; Lion Motor Parts Co., Philadelphia, Pa.
LITTLE SIX—Puritan Machine Co., Detroit.
LOGAN—Garford Motor Truck Co., Lima, Ohio; Gramm Motor Truck Co., Lima, Ohio.
LOZIER—Puritan Machine Co., Detroit; Philadelphia Machine Works, Philadelphia, Pa.
L. P. C.—American Motors Parts Co., Indianapolis; Auto Parts Co., Chicago.

M
McINTYRE—Puritan Machine Co., Detroit.
MARATHON—Marathon Service Co., Nashville, Tenn.; Puritan Machine Co., Detroit.
MARION—Puritan Machine Co., Detroit; Auto Parts Co., Chicago; American Motors Parts Co., Indianapolis; Marion Auto Service Co., New York City; K. C. Auto Parts Co., 1827 McGee St., Kansas City, Mo.; Stutz Motor Car Co., 2450 Michigan Ave., Chicago.
MARRON—Puritan Machine Co., Detroit.
MARQUETTE—Puritan Machine Co., Detroit.
MARVEL—Puritan Machine Co., Detroit.
MASON—Mason Motor Car Co., Detroit; Puritan Machine Co., Detroit.
MATHER—Puritan Machine Co., Detroit.
MATHESON—Matheson Auto Co., Wilkes-Barre, Pa.
MAXWELL (Old)—Standard Motor Parts Co., Newcastle, Ind.; Puritan Machine Co., Detroit; Auto Gear and Parts Co., Chicago.
MAYTAG-MASON—Mason Motor Car Co., Detroit; Puritan Machine Co., Detroit.
MERCHANT—Puritan Machine Co., Detroit.
METEOR—Meteor Motor Car Co., Piqua, Ohio.
MICHIGAN—Michigan Motor Car Co., Detroit; Puritan Machine Co., Detroit; Philadelphia Machine Works, Philadelphia; Dauch Mfg. Co., Sandusky, Ohio; Jos. C. Gorey, 354 W. 50th St., New York City; K. C. Auto Parts Co., 1827 McGee St., Kansas City, Mo.
MIDDLEBURY—Puritan Machine Co., Detroit; H. Goldberg, 1420 S. 8th St., Philadelphia; A. J. Levensood, 153 N. 4th St., Reading, Pa.
MIDLAND—Levene Motor Co., Philadelphia; Puritan Machine Co., Detroit; Auto Parts Co., Chicago; K. C. Auto Parts Co., 1827 McGee St., Kansas City, Mo.; Midland Motor Co., 2200 Diamond St., Philadelphia, Pa.
MIER—Mier Carriage & Buggy Co., Ligonier, Ind.
MILLER—Puritan Machine Co., Detroit.
MILWAUKEE—Harris Bros. Co., Chicago.
MONARCH—Puritan Machine Co., Detroit.
MORA—Jos. C. Gorey, New York; Philadelphia Machine Works, Philadelphia.
MOYER—Puritan Machine Co., Detroit.

N
NANCE—Jos. C. Gorey, New York.
NORTHERN—Puritan Machine Co., Detroit.
NORTH WESTERN—Puritan Machine Co., Detroit.
NYBERG—Puritan Machine Co., Detroit; Levene Motor Co., Philadelphia; V. A. Longaker, Indianapolis.

O
OHIO—Northway Auto Parts & Sales Co., Cincinnati; A. O. Smith Co., Milwaukee; Puritan Machine Co., Detroit.
OLIVER—Oliver Motor Truck Co., Detroit; Puritan Machine Co., Detroit.
OMAHA—A. O. Smith Co., Milwaukee; Puritan Machine Co., Detroit.
ORIENT—Metz Co., Waltham, Mass.
ORSON—Dreenco Machine Co., Broadway & 50th St., New York City.
OTTO-MOBILE—Holly Motor Co., Mt. Holly, N. J.
OVERHOLT—A. O. Smith Co., Milwaukee.
OWEN—Puritan Machine Co., Detroit.

P
PACKERS—Puritan Machine Co., Detroit.
PALMER-SINGER—Singer Motor Co., Long Island City, N. Y.; Puritan Machine Co., Detroit; A. O. Smith Co., Milwaukee; Dreenco Machine Co., Broadway & 50th St., New York City.
PARRY—Motor Car Mfg. Co., Indianapolis; Pathfinder Co., Indianapolis, Ind.

CAR COMPANY AND ADDRESS
PEABODY—Puritan Machine Co., Detroit.
PENN—Puritan Machine Co., Detroit; Buda Co., Harvey, Ill.; Levene Motor Co., Philadelphia.
PENNSYLVANIA—Puritan Machine Co., Detroit; Central Auto Supply Co., Philadelphia; Dougherty, 1845 N. 19th St., Philadelphia.
PERU—Puritan Machine Co., Detroit.
PETREL—Flier & Stowell Co., Milwaukee.
PIERCE-RACINE—Puritan Machine Co., Detroit; Pierce Motor Co., Racine, Wis.
PIONEER—Pioneer Car Mfg. Co., Oklahoma City, Okla.
PITTSBURGH—Chester Engineering Co., Chester, Pa.
POPE-HARTFORD—Hartford Motor Car Co., Hartford, Conn.; Walker & Barkman Mfg. Co., Hartford, Conn.; Puritan Machine Co., Detroit; Boulevard Motor Co., Cambridge, Mass.; J. Rosenfeld, 521 6th St., South, Boston.
POPE-TOLEDO—Auto Salvage Parts Co., Chicago.
POPE-TRIBUNE—Pope-Hartford Mfg. Co., Hartford, Conn.
POSS—Puritan Machine Co., Detroit.
PRATT-ELKHART—Elkhart Carriage & Motor Car Co., Elkhart, Ind.
PUNGS-FINCH—Pungs-Finch Auto & Gas Engine Co., Detroit.

Q
QUEEN—Puritan Machine Co., Detroit.

R
RANDOLPH—Randolph Motor Truck Co., Flint, Mich.; De Kaib Wagon Co., De Kaib, Ill.
RAINIER—Puritan Machine Co., Detroit; Garford Motor Truck Co., Lima, Ohio.
RAPID—Puritan Machine Co., Detroit.
RAYFIELD—Holmes Garage, Danville, Ill.
R. C. H.—R. C. H. Corp., Detroit; Jos. C. Gorey, New York; W. J. Burt Motor Car Co., Los Angeles, Cal.; Puritan Machine Co., Detroit.
READING—H. Goldberg, 1420 S. 8th St., Reading, Pa.
REED—Puritan Machine Co., Detroit.
RELIABLE-DAYTON—Puritan Machine Co., Detroit.
RELANCE—Puritan Machine Co., Detroit.
REPUBLIC—Republic Motor Car Co., Youngstown, Ohio.
RICKETTS—Ricketts Auto Works, Detroit.
RIDER-LEWIS—Levene Motor Co., Philadelphia; Puritan Machine Co., Detroit; V. A. Longaker, Indianapolis; Auto Parts Mfg. Co., Detroit.
ROYAL TOURIST—Puritan Machine Co., Detroit.

S
SAMPSON—Standard Motor Parts Co., Newcastle, Ind.; Puritan Machine Co., Detroit.
SANDUSKY—Dauch Mfg. Co., Sandusky, Ohio.
SCHACHT—General Auto Repairs Co., Cincinnati; Puritan Machine Co., Detroit.
SELDEN—Puritan Machine Co., Detroit.
S. G. V.—Dreenco Mach. Co., Broadway & 50th St., New York City; N. J. Machinery Co., Newark, N. J.
SIBLEY—Sibley Motor Car Co., Detroit.
SOMMER—Sommer Motor Co., Detroit.
SOUTHERN—Southern Auto & Equipment Co., Atlanta, Ga.; Puritan Machine Co., Detroit.
SPAULDING—Puritan Machine Co., Detroit.
SPEEDWELL—Puritan Machine Co., Detroit; Green Engineering Co., Dayton, Ohio.
SPRINGFIELD—R. Hass Elec. & Mfg. Co., Springfield, Ill.
STANDARD SIX—St. Louis Car Co., St. Louis, Mo.; Puritan Machine Co., Detroit.
STAR—Mier Carriage & Buggy Co., Ligonier, Ind.
STAYER—Puritan Machine Co., Detroit.
STERLING—Keith Brothers, Elkhart, Ind.
STEVENS-DURYEA—Walk Hill Garage, 726 Walk Hill St., Mattapan, Mass.
STODDARD-DAYTON—Standard Motor Parts Co., Newcastle, Ind.; Puritan Machine Co., Detroit; Dayton Auto Repair Co., New York City.
SUBURBAN—Puritan Machine Co., Detroit.
SULTAN—Jos. C. Gorey, New York City.

T
THOMAS—E. R. Thomas Motor Car Co., Buffalo, N. Y.; Puritan Machine Co., Detroit; W. H. Johns, 908 W. Pico St., Los Angeles, Cal.; J. Rosenfeld, 521 6th St., South, Boston.
TINCHER—Chicago Coach & Carriage Co., Chicago.
TOURINE—Jos. C. Gorey, New York.
TOURIST—W. J. Burt Motor Car Co., Los Angeles, Cal.
TRAVELER—Traveler Automobile Co., Evansville, Ind.
TWOMBLY—Driggs-Seabury Ordnance Co., Sharon, Pa.

V
VAN—L. C. Erbes, Waterloo, Iowa.
VAN DYKE—Puritan Machine Co., Detroit.
VICTOR-THOMAS-DETROIT—Puritan Machine Co., Detroit.

W
WAGENHALLS—Riverside Machinery Depot, Detroit.
WAHL—Harris Bros. Co., Chicago; Barley Mfg. Co., Streator, Ill.; Puritan Machine Co., Detroit.
WALTHAM-ORIENT—Metz Co., Waltham, Mass.
WARREN—Puritan Machine Co., Detroit.
WASHINGTON—Puritan Machine Co., Detroit.
WATERLEY ELECTRIC—V. A. Longaker Co., Indianapolis.
WAYNE—Auto Parts Mfg. Co., Detroit; Puritan Machine Co., Detroit.
WELCH-DETROIT—Puritan Machine Co., Detroit.
WELCH-MARQUETTE—Oldsmobile Co., Chicago, Ill.
WELCH-PONTIAC—Puritan Machine Co., Detroit.
WHITING—Chevrolet Motor Co. of Michigan, W. Kearsley St., Flint, Mich.; Puritan Machine Co., Detroit.
WOODWORTH—Puritan Machine Co., Detroit.

Y
YALE—Consolidated Mfg. Co., Toledo, Ohio.

Z
ZIL—H. A. Huebner, Davenport, Iowa.

Knowing Volume of Traffic Necessary to

By James T. Sullivan

Construct Highways for Service

Bay State Takes Census Every Three Years and Bases Its Construction Program

THAT states may get a better conception of traffic conditions, a traffic census might well be taken at intervals so that each may know all phases such as comparative increases and be governed by the information thus obtained in laying out and constructing their highways to the end that they are built for endurance. Only by taking a census over a period of weeks or a month can fairly accurate figures be obtained. The checking should be thorough for in that way only can basic figures be gained that will be indicative of general conditions.

The Bay State is the only commonwealth, so far as known, that makes a traffic census every 3 years. The 1915 figures give comparative changes since 1909.

For example, the figures show that in August, 1909, 58 per cent of the vehicles on the road were horse-drawn, and 42 per cent, or a minority, were motor propelled. Six years later the horse-drawn vehicles in August were 17 per cent and the motor cars 83. In the 3 years from 1909 to 1912 motor cars jumped to 67 per cent and horse-drawn vehicles dropped to 33 per cent.

In October, 1909, the horse-drawn vehicles equaled 65 per cent of the whole and the motor vehicles, 35 per cent, yet in October, 1915, 82 per cent was motor cars and 18 per cent horse-drawn vehicles.

Plan Adopted in 1909

The traffic census plan was adopted by the Massachusetts highway commission in 1909 to get an estimate of what sort of traffic was passing over the Massachusetts highways. In that way it was proposed to prepare a campaign of construction based on the figures secured. The state was divided into zones. In 1909 there were five zones covering the trunk highways. In 1912 there were four, and in 1915 the divisions were practically the same as in 1912.

Division 1, with forty-six stations, took in the Berkshire section from the New York state line eastward to the Connecticut river in the vicinity of Springfield and Northampton, south to the Connecticut line, then along toward Worcester. Division 2 embraced the northern section along the Mohawk trail route paralleling the Vermont and New Hampshire lines, and east as far as the Fitchburg-Worcester route, with eighteen stations. Division 3 stretched in a horizontal line eastward from about Worcester to Boston, and comprised all the routes thereabouts and north along the north shore from Boston leading to New Hampshire, with seventy-two stations. Division 4 took in all the routes south of the line and the south shore and

Rhode Island-Connecticut connections with fifty-six stations. In these divisions every trunk highway was thoroughly covered.

In 1909 there were 237 stations; in 1912 the number was reduced to 155, and in 1915 the stations totaled 192. Boston and its environs were included in a separate division where statistics were tabulated by the Metropolitan and Boston park officials at eleven other stations in 1912 and 1915, so that there were approximately 200 stations taking a count in 1915.

The commission insisted upon accuracy, and so it had a number of the same monitors taking a count at about the same place each time. One count was taken in August to represent the heaviest touring month. The other count was taken in October, representing supposed normal traffic. Each observer tabulated on a card the various vehicles passing him in either direction. The observers served for 7 days each time, or a total of 14 days each year. Their hours were from 7 a. m. to 9 p. m., or a total of 14 hrs. daily. The count began on a Sunday morning and ended on a Saturday night. Therefore the results were admirable for comparative details.

Beginning with August, 1909, reports show that in 7 days there were 37,591 horse-drawn vehicles counted, while the motor vehicles reached 27,309. In other words there were 10,282 more horse-drawn vehicles. There was not much difference between the light and heavy vehicles, for the former had 19,622 and the latter 17,969. Of the motor cars there were 5922 runabouts and 21,387 touring cars, and there were not enough motor trucks to bother about counting them in.

In October that same year the traffic was supposed to be normal. It showed there were 11,966 fewer vehicles on the road than 3 months previous. In other words the totals dropped from 64,900 to 62,932. Of this drop the motor cars showed the greater figure for there were but 18,509, or 8800 less, while the horse-drawn vehicles totaled 34,423, or a drop of only 3168. Of the horse-drawn vehicles the heavier, or those with two or more horses, went ahead of the single horse teams in October, 1909. In August there were 1653 more single horse-drawn vehicles than heavier ones, while in October there were 1511 two or more horse-drawn than single ones, or an approximate gain of 3161. In

percentages, the horse-drawn with 65, was far above the motor cars with 35. In other words the horse-drawn vehicles gained 7 per cent in the October totals while the motor cars lost that amount.

While these figures were well worth while, their value was greatly increased when the highway commission made its count again, this time in 1912. With the experience of the first census it was possible to decrease the number of stations and amalgamate the districts into four instead of five without losing any of the benefit.

Many Changes Noted

In August, 1912, census takers went out on the roads for another 7 days, and when the cards were all turned in they showed some surprising changes. For example, the number of horse-drawn vehicles was cut nearly in half. From 37,591 in 1909 the figures dropped to 19,809, a decrease of 17,782 less. The single horse vehicles showed the bigger drop with 10,302 to 7480 for the heavier vehicles.

Motor vehicles, on the other hand, made a big jump turning the scales against the horse-drawn vehicles. The motors showed a gain of 13,082, or a total of 40,391 vehicles on the roads out of 60,200. In other words the motor percentage was 67 and the horse-drawn 33. Figures show there were 20,582 more motor cars than horse-drawn vehicles, or more than two to one.

October, 1912, gave the tabulators another seven days' tour of duty, and again the figures compiled showed interesting comparisons. There were 49,924 vehicles counted or 10,276 less than in August. It showed a total of 29,204 motor vehicles, or 11,187 less than in August. Of the horse-drawn there were 20,720, or a gain of 911 more than in August. The final figures showed that there were but 8464 more motor cars than horse-drawn vehicles in October, when in August the motors were 20,582 more; this bringing down the motor percentage increase from summer, of motors 67, horses 33, to motors 59, horses 41 in fall. In the fall the two or more horse-drawn, or heavier vehicles, increased from 10,489 to 12,168, a gain of 1679, while the single horse vehicles dropped down 768. In 1909 there were not enough commercial vehicles to tabulate. In August, 1909, there were 1764 counted and in October there were 1836, a gain of 72.

Massachusetts Traffic Census—1909—1912—1915

AUGUST—7 DAYS—7 A. M. TO 9 P. M.—1909

	HORSE DRAWN				MOTOR CARS			TOTALS					PERCENTAGES				AVERAGE NUMBER OF VEHICLES					
	SINGLE HORSE		TWO OR MORE		Runabouts	Touring Cars	Trucks	HORSE DRAWN					HORSE DRAWN				HORSE DRAWN			Automobiles	All Kinds	No. of Stations
	Light	Heavy	Light	Heavy				Light	Heavy	All	Automobiles	All Kinds	Light	Heavy	All	Automobiles	Light	Heavy	All			
Division 1.....	1,464	688	201	618	362	1,475	Not	1,665	1,306	2,971	1,837	4,808	35	27	62	38	67	53	119	73	192	25
Division 2.....	2,947	1,173	165	795	434	1,335	countd	3,112	1,968	5,080	1,796	6,840	45	29	74	26	107	68	175	61	236	29
Division 3.....	2,595	1,690	209	1,144	695	2,571	in	2,804	2,834	5,638	3,266	8,904	31	32	63	37	59	60	119	70	189	47
Division 4.....	6,251	4,693	323	2,304	2,756	9,083	1,909	6,574	6,907	13,481	11,839	25,320	26	27	53	47	85	90	175	154	329	77
Division 5.....	5,263	3,804	204	1,150	1,675	6,923		5,467	4,954	10,421	8,598	19,019	29	26	55	45	93	84	177	146	323	50
Totals.....	18,520	11,958	1,102	6,011	5,922	21,387		19,622	17,969	37,591	27,309	64,900	+30	28	58	42	83	76	159	115	274	237
AUGUST—7 DAYS—7 A. M. TO 9 P. M.—1912																						
Division 1.....	1,923	1,378	247	878	1,056	5,844	369	2,170	2,265	4,435	7,269	11,704	18	20	38	62	57	60	117	191	308	38
Division 2.....	884	334	32	247	267	1,282	44	916	581	1,497	1,593	3,090	29	19	48	52	61	39	100	106	206	15
Division 3.....	2,568	2,707	166	1,250	2,875	12,839	835	2,784	3,957	6,691	17,549	24,240	11	16	27	73	52	74	126	331	457	83
Division 4.....	3,431	2,850	69	836	2,357	11,107	516	3,500	3,686	7,186	13,980	21,166	17	17	34	66	72	75	147	285	432	49
Totals.....	8,806	7,278	514	3,211	6,556	32,072	1,764	9,320	10,489	19,809	40,391	60,200	+16	17	33	67	60	68	128	260	388	155
AUGUST—7 DAYS—7 A. M. TO 9 P. M.—1915																						
Division 1.....	1,461	1,601	151	1,013	2,725	13,771	1,144	1,612	2,614	4,226	17,640	21,866	07	12	19	81	35	57	92	383	475	46
Division 2.....	1,014	658	45	322	1,065	5,045	372	1,059	980	2,039	6,482	8,521	12	13	24	76	59	54	113	360	473	18
Division 3.....	2,828	3,534	276	1,873	7,377	32,096	3,869	3,104	5,407	8,511	43,342	51,853	06	10	16	84	43	75	118	603	730	72
Division 4.....	2,282	2,820	74	965	4,305	25,141	2,285	2,356	3,785	6,141	31,731	37,872	06	10	16	84	42	68	110	566	676	56
Totals.....	7,585	8,613	546	4,173	15,472	76,053	7,670	8,131	12,786	20,917	99,194	120,112	07	10	17	83	42	67	109	517	627	192
OCTOBER—7 DAYS—7 A. M. TO 9 P. M.—1909																						
Division 1.....	1,254	730	175	779	289	1,473	not	1,429	1,569	2,998	1,762	4,760	30	32	62	38	55	58	113	68	181	26
Division 2.....	2,644	1,204	131	957	332	1,124	countd	2,775	2,161	4,936	1,456	6,392	43	34	77	23	93	72	165	48	213	30
Division 3.....	2,272	1,769	177	1,243	520	2,353	in	2,449	3,012	5,461	2,873	8,334	29	36	65	35	54	67	121	64	185	45
Division 4.....	5,194	4,234	285	2,117	1,875	6,190	1900	5,479	6,351	11,830	8,065	19,895	28	32	60	40	71	83	134	104	238	77
Division 5.....	4,182	3,636	142	1,304	979	3,374		4,324	4,934	9,258	4,353	13,611	32	36	68	32	70	80	150	70	220	62
Totals.....	15,546	11,567	910	6,400	3,995	14,514		16,456	17,967	34,423	18,509	52,932	+31	33	65	35	69	75	144	77	221	240
OCTOBER—7 DAYS—7 A. M. TO 9 P. M.—1912																						
Division 1.....	1,633	1,413	270	1,126	997	4,813	307	1,903	2,541	4,444	6,117	10,561	18	24	42	58	50	67	117	161	278	38
Division 2.....	878	404	95	788	322	1,201	58	973	1,190	2,163	1,581	3,744	26	32	58	42	65	79	144	106	250	15
Division 3.....	2,641	2,854	140	1,529	2,350	10,298	954	2,781	4,383	7,164	13,602	20,766	13	31	34	66	50	78	128	243	371	56
Division 4.....	2,802	2,967	93	1,087	1,414	5,973	517	2,895	4,054	6,949	7,904	14,853	20	27	47	53	59	83	142	161	303	49
Totals.....	7,954	7,638	598	4,530	5,063	22,285	1,836	8,552	12,168	20,720	29,204	49,924	17	24	41	59	54	77	131	185	361	158
OCTOBER—7 DAYS—7 A. M. TO 9 P. M.—1915																						
Division 1.....	1,397	1,479	179	974	3,290	14,672	1,096	1,576	2,444	4,020	19,058	23,078	7	10	17	83	34	53	87	414	501	46
Division 2.....	761	514	58	695	1,143	5,460	319	810	1,122	1,941	6,922	8,863	9	11	20	80	48	66	114	407	521	17
Division 3.....	2,935	3,573	359	1,996	7,868	32,680	3,557	3,294	5,569	8,863	44,114	52,977	6	10	16	84	45	76	121	604	725	73
Division 4.....	2,095	2,654	84	1,092	3,719	17,540	1,878	2,179	3,736	5,915	23,137	29,052	8	12	20	80	38	66	104	405	509	57
Totals.....	7,188	8,211	680	4,660	16,020	70,361	6,850	7,868	12,871	20,739	93,231	113,970	7	11	18	82	40	67	107	483	590	193
AUGUST—7 DAYS—7 A. M. TO 9 P. M.—1909																						
Metropolitan Parks.....	973	372	69	242	1,130	4,245	*	1,042	624	1,666	5,375	7,031	15	9	24	76	208	125	331	1,075	1,407	2
Boston Parks.....	616	169	136	78	444	2,641	*	752	187	939	3,085	4,024	18	5	29	77	236	62	303	1,028	1,341	3
Metropolitan Parks.....	516	470	34	327	1,829	8,036	189	558	797	1,347	10,654	11,401	5	7	12	88	69	100	169	1,256	1,425	8
Boston Parks.....	310	708	94	511	893	3,778	369	413	619	1,032	5,020	6,052	7	10	17	83	138	206	314	1,673	2,017	7
AUGUST—7 DAYS—7 A. M. TO 9 P. M.—1915																						
Metropolitan Parks.....	287	378	14	240	3,836	14,931	627	361	618	919	20,304	21,312	1	3	4	96	38	77	115	2,749	2,664	8
Boston Parks.....	393	295	21	244	1,929	4,990	407	714	509	1,223	7,225	8,558	8	6	14	86	208	170	498	2,445	2,853	6
OCTOBER—7 DAYS—7 A. M. TO 9 P. M.—1909																						
Metropolitan Parks.....	708	394	68	293	776	2,571	*	766	61	1,385	3,947	4,728	16	13	29	71	158	123	276	969	946	5
Boston Parks.....	686	213	25	65	633	2,698	*	642	278	1,220	3,241	4,461	21	6	27	73	314	93	497	1,080	1,120	3
OCTOBER—7 DAYS—7 A. M. TO 9 P. M.—1912																						
Metropolitan Parks.....	663	496	30	309	1,554	6,451	598	633	780	1,413	8,363	9,776	6	8	14	86	79	98	177	1,045	1,222	5
Boston Parks.....	716	436	217	29	1,279	2,347	721	933	695	1,388	4,347	5,935	16	11	27	73	391	298	529	1,449	1,978	6
OCTOBER—7 DAYS—7 A. M. TO 9 P. M.—1915																						
Metropolitan Parks.....	446	504	27	316	3,738	14,941	582	176	86	1,422	20,291	21,524	2	4	5	94	61	165	267	2,222	2,549	7
Boston Parks.....	Not tabulated																					

*Not counted.

Members of the highway commission were anxious to have additional figures, but they decided to wait three years again, so in 1915 elaborate preparations were made for the third census. This was more interesting, for the stations were nearer the places where they were held in 1912. In August the tabulators went out to get their data. When they finished they turned in cards showing that in seven days there were counted 120,112 vehicles. That was 59,800 more than in August, 1912, or within a few of making it just twice as many vehicles.

Fewer Single-Horse Vehicles

The single-horse vehicles showed a loss of 1189, dropping from 9320 to 8131. The heavy horse-drawn vehicles showed a gain of 2297. The total gain for the horses was just 1108. Motor vehicles made a great sweep, for the figures showed that out of the 120,112 vehicles 99,195 were motor cars. The gain over August, 1912, was 58,804, or within 1496 of being as high as all the vehicles of all kinds tabulated that year. It swept the percentages for motors away up to 83, while it lowered the horse-drawn vehicles accordingly down to seventeen. Thus for the three different census returns it shows for August, the following percentages:

	1909	1912	1915
Motor vehicles.....	42	67	83
Horse-drawn	58	33	17

Next we come to October, 1915. There were tabulated 113,970 vehicles, or 6142 less than in August. While the motor vehicles showed a decrease of 6124, the horse-drawn drop was but 178. Of the total vehicles the motor vehicles were 93,231, and the horse-drawn, 20,739. This made the percentage figures for October read motor vehicles 82, horse-drawn 18, or a gain of 1 per cent for the latter. In other figures there were 72,492 more motor vehicles than horse-drawn on the road in October. Going back to October, 1909, it is interesting to note that there were 15,914 more horse-drawn vehicles than motors, while in 1912 the motor vehicles had not only caught up, but showed a lead of 3475. To make further comparisons it shows that from 1909 to 1912 there was a steady drop in horse-drawn vehicles, the totals being nearly cut in two, but that in the next three years, while the motor cars were jumping rapidly, the horse-drawn vehicles were about stationary. Thus we see the figures hovering about 20,000 from 1912 to 1915. The change between October, 1912, and the same month in 1915 is only a difference of 19 horse-drawn vehicles, an increase of that number being reported. There is a difference of less than 200 between August, and October, 1915, in horse-drawn vehicles. The percentages for the three years for October each year is as follows:

	1909	1912	1915
Motor vehicles.....	35	59	82
Horse-drawn	65	41	18

It is interesting also to note the gain in the trucks in the last six years. From no tabulation in October, 1909, it showed

1836 in October, 1912, and 6850 in October, 1915. In exact figures there is a gain in three years of 5014.

The classification of the motor vehicles makes a study worth while also. In August, 1909, there were 5922 runabouts to 21,387 touring cars, the bigger machines outnumbering the smaller by 15,465. In October that year there were 14,514 touring cars and 3995 runabouts, the former being 10,519 more. Three years later in August there were 25,517 more touring cars than runabouts, the figures being 32,072 to 6555. In October, with 22,285 touring cars and 5083 runabouts the former were 17,202 more. In 1915 there were 76,053 touring cars and 15,472 runabouts tabulated in August, or 60,581 more of the heavier vehicles. In October there were 70,361 of the larger cars and 16,020 of the smaller, or 54,341 more touring cars.

In the park system the horse-drawn vehicles have been steadily decreasing while the motor vehicles have increased largely as the figures tabulated show. Those figures give a good indication of the motoring in and about Boston, for the parks lead out so that the census takers were able to get figures within a radius of about eight miles outside Boston, and from that edge right into the city proper.

The highway commission in making its findings upon the census figures outlined some of its conclusions as follows: "The tabulations were made to show the average number of vehicles of each class passing a given point per day, the total number of both kinds, etc. When these figures were obtained the percentage of each class of vehicle using the particular road was computed as well.

"After these averages were computed

for each of the 238 stations in 1909, and for the 156 stations in 1912, and the 193 stations in 1915, the total average number of vehicles at all various stations was added, the number ascertained, and from this was obtained the average number of vehicles passing each day at all points where the count was made, as well as the average number of each class and kind, and the percentage that each class bore to the average total number.

In Massachusetts the traffic using the roads is constantly increasing, but it is changing much more rapidly than it is increasing. This is conclusively shown by the tabulation below.

The figures mentioned represent a thorough study for fourteen days of fourteen hours each day, and they show that in 1909 the average number of vehicles on the highway was 247. In 1912 it had reached 351, and in 1915 the number jumped to 606 daily at each station on an average. Naturally the number passing each station varied from 125 a day, or twenty on a road out in the country to 3000 on a main highway near Boston.

The most important feature, however, is not the total increase so much as in the change in the class of vehicles using the highways. Motor vehicles, which had increased in numbers 131 per cent from 1909 to 1912, or from 96 to 222 a day, again increased 129 per cent from 1912 to 1915, or from 222 to 500 daily. On the other hand, the number of teams using the road decreased on an average 14 per cent, from 151 a day in 1909 to 129 daily in 1912, and again decreased 18 per cent from 129 in 1912 to 106 daily in 1915.

Meanwhile the net increase in travel on the roads was 72 per cent in the last

COMPARISON OF TRAFFIC IN 1912 AND 1915

	1912 census 156 stations			1915 census 192 1/2 stations			
	Average total number per day	Average per day per station	Per cent of each class	Average total number per day	Average per day per station	Percent of each class	Percent increase or decrease over 1912
MOTORS							
Runabouts	5,819	87.2	11	15,746	82	13.6	+ 122
Touring cars	27,178.5	173.5	49	73,207	380	63	+ 144
Trucks	1,800	11.5	3	7,200	38	6	+ 230
Total	34,797.5	222.2	63	96,213	500	82.5	+ 129
HORSEDRAWN							
1-horse, light.....	8,380	53.5	15	6,886	36	6	-33
1-horse, heavy.....	7,458	47.6	14	8,412	44	7	-7
2 or more horses, light.....	658	4.1	1	613	3	.5	-17
2 or more horses, heavy	3,870.5	24.7	7	4,417	23	4	-7
Total horsedrawn.....	20,204.5	129.4	37	20,234	106	17.5	-18
Total, all kinds.....	55,002	351.6		116,451	606		+ 72

COMPARISON OF TRAFFIC IN 1909 AND 1912

	1909 Average per station per day	1912 Average per station per day	1915 Average per station per day	Percent increase in 6 years
MOTORS				
Runabouts	20.8	37.2	82	+200
Touring cars	75.3	173.5	380	+405
Trucks		11.5	38	.....
Total	96.1	222.2	500	+420
HORSEDRAWN				
1-horse, light.....	71.6	53.5	36	-35
1-horse, heavy.....	49.3	47.6	44	-11
2 or more horses, light.....	4.2	3.6	3	-28
2 or more horses, heavy.....	26	24.7	23	-12
Total horse-drawn.....	151	129.4	106	-30
Total all kinds.....	247.1	351.6	606	+145

The Readers' Clearing House

LARGE GARAGES COMPLETELY EQUIPPED

Layout for Two-Story Building 50 by 140 feet

TWO-STORY FIREPROOF GARAGE Building to Be Built on Lot 50 by 140 Ft. in Size

BISMARCK, N. D.—Editor *MOTOR AGE*—Give us a sketch for a two-story fireproof building with basement to be used as a garage. The lot is 50x140 and is an inside lot facing south. The garage will be steam heated from a central heating plant. It will be used for sales, storage and repairs.—Bismarck.

In Fig. 1 are layouts for the three stories. In Fig. 2 is the *MOTOR AGE* conception of how the exterior should look. To support a building of this span it would of course be quite necessary that the basement carry a number of pillars. Cast-iron pipe pillars of 6 or 8 in. diameter arranged as shown should give substantial support. Pillars will also be necessary in the first floor to carry the second floor and roof. These can be arranged in the manner shown without greatly cutting up the floor space. The machine shop is in the rear of the first floor, the most satisfactory place for a machine shop in a building of these dimensions.

You will note that the elevator is located in the rear to permit entry either from the front or from an alley in the rear.

GARAGE FOR 66 BY 132 FT. SITE Paved Yard Provided for Minor Repairs Out of Building

Reedsville, Wis.—Editor *MOTOR AGE*—We are contemplating building a garage 50 by 130 of tile block and want the following rooms: Show room, service room, stock room, general office, also small private office and large room for storing cars. Kindly give us some idea as to arrangement. We have a corner lot 66 by 132. The front and 16 ft. on the side should be of plate glass.—Hepenburg & Reichert.

In Fig. 3 is printed a layout for a garage that is designed to meet your requirements. You will note that the additional space in the lot has been taken up with a paved yard which will not only present an attractive appearance but will be useful in making minor repairs on cars when the interior of the garage is crowded or the job is so small that it would not pay to drive the car inside. The show room is located to afford window display on both streets. You will note that provision is made for a stairway. The construction of your building very likely would leave sufficient room for loft in which could be kept bulky or seldom used accessories.

No Figures on Wheel Slip

Chicago—Editor *MOTOR AGE*—I have a Hudson Super Six with a gear ratio of 4 1/2 to 1. What is the per cent of slippage on the rear wheels at a speed of 70 miles per hour?—Walter M. Crawford.

The only way this could be determined would be to have exact figures of the fac-

tor of friction of the surface upon which the car would be driven. Then it would have to be assumed that the car was driven over a perfect flat surface, without the slightest irregularity to make the wheels lift from the ground under this high speed. For ordinary pavements or country roads the figure could not even be approximated.

BUICK ELECTRICAL DIFFICULTIES Possible Cause Is in Terminals at Battery Loose or Corroded

Ascutneyville, Vt.—Editor *MOTOR AGE*—I have a four-cylinder 1917 Buick where the lights are giving trouble. When I switched them on could not get a light. After trying a few times the light came. Then I started the engine, then tried lights and could not get a light. I found that the wires were tight and the switch made good contact at headlight and battery wires. The bulbs must be all right, as I got a light after they went out the first time. Battery is in good condition. Where else should I look for trouble?

2—Could you give me a diagram of the light-

ing system of the 4 Buick 1917?—J. C. Gardner.

1—Trouble of this nature can originate in loose connections in a great number of places throughout the electrical system. A complete check of every terminal and connection is the best way to get at it. We have seen just such trouble come from crusted battery terminals. Remove the wire terminals from the battery and scrape the taper off clean with a knife or file. Do not remove much stock or you will destroy the correct fit of the taper. Be sure that the terminals are screwed in tight again. The slightest looseness may cause such poor contact that the current will be intermittent with the vibration of the car.

2—The wiring diagram is published in Fig. 5. This diagram is taken from the instruction book issued by the Dayton Engineering Laboratories Co., Dayton, Ohio,

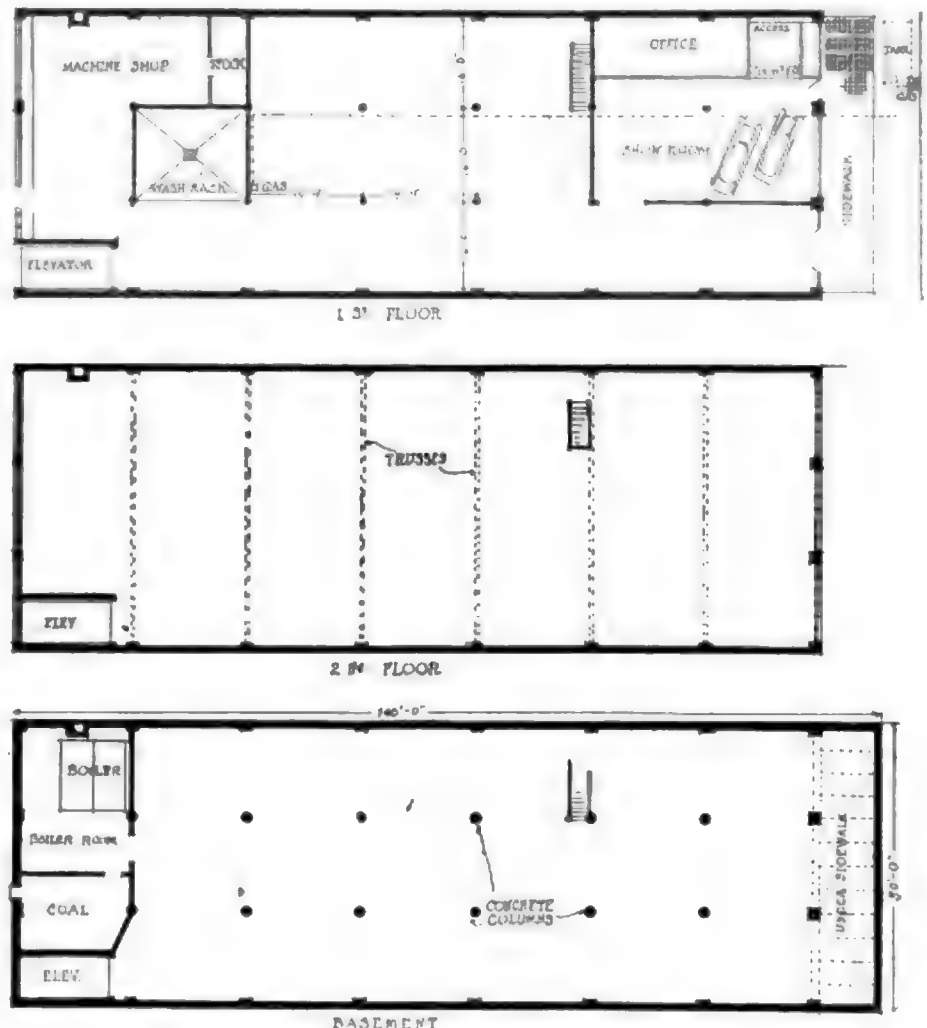


Fig. 1—Layout for two-story garage, showing method of pillar support



Fig. 2—Motor Age artist's conception of exterior appearance of two-story garage, plans of which are shown on the preceding page

especially for the 1917 Buick cars. If you do not have one of the books you should surely write for one.

CHANGING TERMINALS IN BATTERY If Wires Are Exchanged, One for Another, Trouble Results

Lake City, Iowa.—Editor MOTOR AGE—Would changing the wires on a generator on a Model 70 Overland run the storage battery down?

2—Would installing a Bosch magneto and Rayfield carburetor on this car lower the gasoline consumption?

3—Would putting in aluminum pistons decrease the gasoline consumption any?

4—Would vapor and air, mixed, taken into the engine through the manifold save gasoline?

5—Publish plans for rebuilding a Saxon four into a speedster.—Leland Short.

1—If you mean changing the terminal connections one for another it would indeed run the battery down. If you mean by entirely replacing them one for another it would not. Your question is not thoroughly clear.

2—It is impossible to state definitely. It might and it might not.

3—To some extent, yes.

4—Yes, if properly applied.

5—The Saxon four is really more or less of a speedster in its present form. If you will give some idea of how you would wish the transformed job to appear MOTOR AGE can give you a sketch.

GENERATOR TO HELP FORD UNIT Cannot Successfully Combine Separate Dynamo with Magneto

Kokomo, Ind.—Editor MOTOR AGE—Can a generator be installed on a Ford for headlights to be run in addition to the regular Ford generator?

2—Would this small generator do any damage to the regular Ford generator if wired properly? I want this so as to have better lights on slow speed. If this can be done, give a wiring diagram.

3—What is the difference between direct current and alternating current?—W. Curley.

1—No.

2—It would be very inadvisable to try to couple up another generator to work with the Ford magneto. If you are going to have another generator why not let it do all the lighting and cut the Ford magneto system out?

3—In direct current the electrical circuit is in one direction at all times; in alternating current the electrical circuit varies its direction intermittently. To make this clear suppose you put a straw into water

and drew with a steady suction with the mouth at the other end of the straw. The water would pass up the straw in even flow in one direction. The electric current does the same thing in all direct circuit. Now suppose you suck and blow on the straw, alternating the efforts evenly. The water will pass rapidly up and down in the straw. This corresponds to the way the electric current acts in an alternating circuit, although the alternations are of course tremendously fast. As an example of the speed of the alternations, a lamp bulb in an alternating current gives a steady light without flicker.

RACING BODY FOR OVERLAND 51 Good Job Including Alterations on Motor Would Approximate \$500

Jackson, Wis.—Editor MOTOR AGE—Send me a description and tell what would be necessary to make my Overland model 51 touring car into a speedy racer, able to make 60 to 70 m.p.h. What would be the estimated cost, including wire wheels?—Robert J. Froehlich.

You will find illustrated in Fig. 4 our artist's conception of how a shapely and rather inexpensive body could be applied to this model to give it a racer appearance. This body could probably be constructed at an expense approximating \$200.

First of all we would discourage you in the belief that you can step up this old

model to develop 70 m.p.h. It may be possible, but we do not believe so. We will enumerate the things that can be done to a car to make it speedy. Lighter body, removal of all superfluous accessories to reduce weight, lighter pistons, lighter connecting rods, rebored cylinders, more rapid valve lift and drop by tapering off cams, advanced ignition, higher gearing in rear axle, racing carburetor, possibly a new magneto, etc. The cost is whatever you wish to make it. If you wish to equip with a new body, wire wheels and make most of the alterations enumerated above you would be obliged to spend about \$500 for a complete job.

AMMETER CONNECTION ON GRANT Battery for Ignition Will Run Approximately 100 Hours

Ratchiff, Tex.—Editor MOTOR AGE—Give wiring complete of the electrical system used on the Model T 1915 Grant Six, equipped with Allis-Chalmers single-unit starter, and explain how to install the dashboard ammeter on same.

2—Advise how this system may be wired so as to run the car with the starter removed from the car in case I have to send the starter to the factory for repairs, using the storage battery for ignition only, and how long would the six-volt 80-hour storage battery run the car for ignition only? Also, how long would it run the car for both ignition and about 2 hrs. each night for lighting?

3—Give a diagram showing adjustments on all bearings in full-floating rear axle on a Model T 1915 Grant Six.—W. B. Faris.

1—The ammeter connection on this model is a proposition of connecting one ammeter pole with the positive terminal of the battery and the other pole through two wires to the positive battery terminal of the lighting and ignition switch and to the positive battery terminal of the regulator. The wiring is shown in the diagram Fig. 7.

2—In such emergency the factory advises that the generator be removed and the loose wires taped so that they will not come in contact with any metal part of the car. The storage battery is used for ignition only. Should it be necessary to remove the starter for such repairs the 6 volt 80 amp. hr. storage battery should run the car for ignition only approximately 100 hr. and should the battery be required



Fig. 3—Layout for garage 50 by 130 ft., with provision for paved yard for quick fair-weather repairs

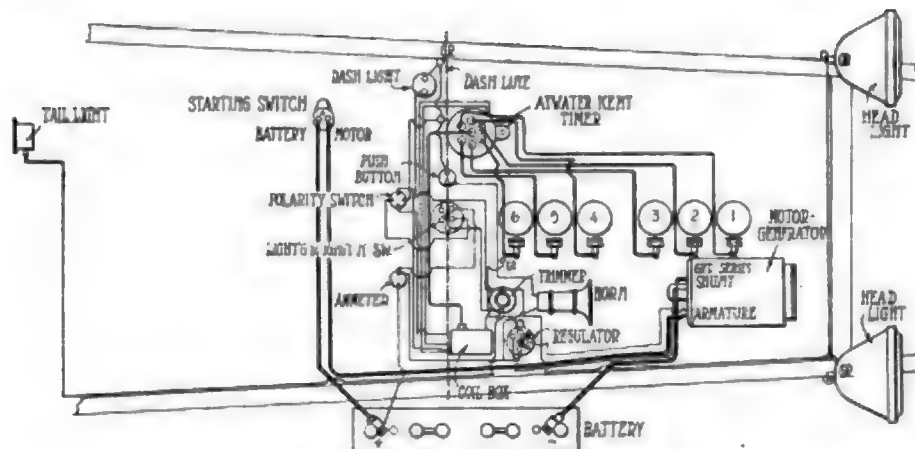


Fig. 7 Wiring diagram of Model T 1915 Grant Six

strain of the car, the tire saver comes in and answer a good purpose in prolonging the life of this rather expensive equipment.

THE ADVANTAGES OF WIRE WHEELS More Resilient, Lighter, Stronger and Snappier Appearing

Kokomo, Ind.—Editor MOTOR AGE—Give the advantage of wire wheels.

2—Should there be any play in the drive shaft on a model 850 Cole 8? It is possible to turn the shaft on this car about $\frac{1}{4}$ in. around.

3—If possible, kindly give more details about Mr. Duray's acquiring the speed he did at Ostend, such as distance traveled, etc.—S. G. Vansickle.

1—Wire wheels give a car a snappy appearance. They are more resilient than wood wheels, effecting a saving on tires. They will stand greater strain than wood wheels, in case of accident or severe driving. They are lighter than wood wheels, thus reducing the amount of unsprung weight.

2—No.

3—The distance traveled was 1 kilometer. This is slightly over a mile, as 1 mile equals 1.6 kilometers. The course was laid out on the sand on the ocean beach at Ostend. The start was a flying one, that is he crossed the starting line with his car under maximum speed.

NO BIG ROTARY VALVE BUILDING Trouble Has Been in Lubricating and Tak- ing Care of Heat

Ouaga, Ia.—Editor MOTOR AGE—Are there any motor car builders using a rotary valve engine? If so, please name them.

2—Is the rotary valve considered a success? If not, why not?

3—Does carbon interfere in their working?—R. I. Galloway.

1—At this writing there is no production in any quantities of rotary-valve motors.

2—So far it has not proven entirely satisfactory. The trouble has been in lubricating and in properly taking care of the effects of heat, such as expansion and contraction of metals and warping.

3—Carbon has given trouble in that the fit to take care of expansion and contraction has had to be loose and it would allow carbon to work between the sleeve and the casting.

Hudson Carburetor and Oil

Kenedy, Tex.—Editor MOTOR AGE—I have a Hudson Super Six. Would a Stromberg carburetor increase the power and speed?

2—What kind of lubricating oil would Motor

AGE recommend, and what should be the height of the oil gauge?—A. F. Kauffmann, Jr.

1—The carburetor on the car is designed especially for it and is, in the estimation of the Hudson engineers, the correct fitting. It is not advised that a change be made.

2—Motor AGE does not recommend special makes of oil. It does advise, however, that only a high-grade product be used. Cheap oil is poor economy. The oil gauge should be between three-quarters full and full at all times.

ATTITUDE TOWARD FRICTION DRIVE This Type of Transmission Has Proven Satisfactory in Light Cars

Moundsville, W. Va.—Editor MOTOR AGE—What is the attitude of the motoring public in regard to the use of friction drive?

2—What is the efficiency of a friction drive, disregarding the loss on bearings due to excessive pressure for frictional purposes?

3—What is the life of a well designed friction drive, and size of same for about 20 horsepower?

4—On a rough guess, what distance will a motorist drive a car in a year?—J. W. Murry.

1—The motoring public has not taken to the friction drive to a great extent in large cars, although it is finding a considerable field in small cars.

2—In cars of light weight the friction loss in very little if any greater than in a sliding gear construction and no more and probably not as much as in a planetary construction. Of course it all depends on the construction. An unscientific construction in any type can bring about a great power loss through friction.

3—The life of the car.

4—The average is around 6000 miles.

Magneto Not Generator

New Windsor, Ill.—Editor MOTOR AGE—I have a Michigan 33 car on which I have installed a new Remy magneto. How can the old Briggs magneto be arranged to run a spotlight? I can run the magneto either by the fan belt or by the flywheel.—J. E. Samuelson.

The expense of altering this magneto into a generator for operating a spotlight would be prohibitive.

Ford Engine Speed

Kellogg, Ida.—Editor MOTOR AGE—How many r.p.m. has a 1916 model Ford motor? Make?—Henry Harris.

At a car speed of 25 m.p.h. the model T motor is turning over approximately 1025 r.p.m. The maximum speed of Ford cars runs from 40 to 45 m.p.h. Accordingly the

engine speeds are from 1650 r.p.m. to 1800 r.p.m.

Although there are no official records concerning the motor speed of the Ford it can be assumed that its maximum is in the neighborhood of 2000 r.p.m.

OVERSIZE PISTONS AND HEATING If Pistons Are Too Tight Motor Will Naturally Overheat

Chillicothe, Ill.—Editor MOTOR AGE—Do oversize pistons tend to make a motor heat?

2—Is there any difference between the coils on the cars now, that take the current from the storage battery, and the coils on cars that take the current from a magneto or dry cell?

3—How many dry cells would it take to furnish ignition current in case it became necessary to remove a 6-volt storage battery of 100-ampere-hour capacity?

4—Does the location of brushes on the commutator have anything to do with the output of generator?

5—When removing a storage battery, if the generator wires were connected why would not that prevent the windings from burning out?—Charles McCoy.

1—Yes, if they are so tight that they are stiff and create too high compression. If they allow the proper clearance they do not overheat the motor.

2—Not in fundamental principles. They are all for the same purpose, namely to step up the voltage. They are in reality transformers. Of course, the modern types are simplified and more compact than the old ones.

3—Six dry cells.

4—Yes. There is one maker who controls the output of his generators by what is known as third-brush regulation.

5—Because if the generator is passing current through itself without any outlet the voltage builds up rapidly and at high speeds it can reach the point where the windings will be burned.

CALCULATING THE SPEED OF MOTOR Reader Suggest Quick Method of Finding R. P. M. of Engine

Oakland, Cal.—Editor MOTOR AGE—Here is a quick method of finding the speed of the motor when the gear ratio is known. Divide the diameter of the tire in inches by the gear ratio, divide the constant 336 by the quotient, multiply the quotient by the speed of the car in miles per hour for the revolution per minute of the motor. For example: a tire 32 in., geared 4 to 1, speed of car, 45 m.p.h.

$$\begin{aligned} 32 \div 4 &= 8 \\ 336 \div 8 &= 42 \\ 42 \times 45 &= 1890 \text{ R.P.M.} \end{aligned}$$

The constant 336 will do for any gear ratio, size of tire or speed.—Arthur Gordon.

Cars Using Double Ignition

Waterloo, Ia.—Editor MOTOR AGE—How many cars are built in America with double ignition?

2—How many racers in this country and abroad have double ignition?

3—How many stock cars at a popular price are made with double ignition?—William Galloway Co.

1—There are six makers using double ignition.

2—There are no available figures from which an accurate statement can be given.

3—There are only two selling for less than \$2,000. These are the Cole and the Luverne.

consisted of 6 ft. of gravel on the bed rock, 40 ft. of clear ice on the gravel and 2 ft. of moss and tundra on top.

The Orient at the Wheel—St. Louis now boasts of a Chinese chauffeur. He is Sit Chan Wah, who drives a truck for the Oriental Tea & Coffee Co. He is said to be a careful driver.

Canadian Association to Meet—The Motor Trades association will meet at Winnipeg, Manitoba, Feb. 13. The program includes talks on good roads, salesmanship, garage systems and service and other business phases of appeal to the members.

Why Cars Shun Australia—Cars do not feel at home in Australia. Why? Well, gasoline sells at 96 cents a gallon, and tires are even higher in proportion. Even the 20,000,000 a year the State of Victoria spends on roads can't entirely balance the price of fuel.

City to Put \$27,000 in Cars—Pittsburgh, Pa., is to spend \$27,000 for motor vehicles. Altogether, twenty-nine machines will be purchased. This policy is attendant on a general retrenchment in budget making, the city deciding to buy the vehicles as a matter of economy.

Hauls House in Parade—A business men's parade at Liberal, Kan., had the distinction of having something new under the sun. A house was mounted on four wheels and attached to the rear of an Apperson road-plane. The house was furnished and occupied, and a Victrola played merrily.

The Longest Cross-Country Trip—W. C. McRea, Mrs. McRea and the two little McReas took six months to come from Sacramento, Cal., to Birmingham, Ala. They went by way of Chicago and then south, traveling 7,384 miles in all. They had one puncture and no engine trouble. The McReas will make their home at Birmingham.

To Repave Twenty Streets—Cleveland, Ohio, has a bond issue of \$3,000,000, and twenty streets are to be repaved this year. This will take \$2,500,000, the largest amount that can be spent efficiently in one year. One-half will be paid by the city; the other half by property owners. The property owners will pay 98 per cent of the repaving, the city paying 2 per cent and the cost of intersections.

Meeker Starts for Washington—It is not the inaugural that is taking Ezra Meeker, the famous transcontinental traveler, in his battered Pathfinder schoonermobile to Washington, but the proposed Pioneer Oregon Trail Bill. For Meeker was one of the original band of pioneers who traversed the plains in ox carts and settled the Pacific coast. Meeker, who is 86 years old, left Washington last May.

Y. M. C. A. Trains Negro Chauffeurs—The problem of finding good jobs for negro boys has been solved partially by the Chicago Y. M. C. A. in the establishment of a motor car school, which is finishing its first year. During the year 123 have enrolled in the school. Eighty-seven have completed the course, and seventy-two have been placed in motorcycle shops, garages, as drivers of trucks and delivery cars and as private chauffeurs. All graduates have passed state examinations.

Omaha Club Work Reviewed—The Omaha automobile club erected 2000 road signs in nine counties of Nebraska and Iowa during 1916. Omaha is the best marked city. More than 900 poles within the city designate the Lincoln highway, George Washington National Highway, O. L. D. highway and the Omaha-Kansas City route. Twenty-three of the twenty-five cars stolen were recovered. Thirty-five rewards were paid to policemen for arresting and convicting persons throwing glass on streets. The membership for 1917 is estimated at 2000. Officers are: President, C. L. Gould; vice-presidents, Randall K.

Brown and W. B. Cheek; secretary, L. V. Nicholas; treasurer, Colonel B. W. Jewell; and counsel, P. A. Wells.

May Name Road for Buffalo Bill—From Lincoln, Neb., comes word that a movement has started to change the name of the motor road known as the Old highway to the Buffalo Bill trail. The route is that from Omaha, Neb., to Denver, Colo.

To Organize County Units—The Alabama Automobile Dealers' Association, Birmingham, Ala., will extend its membership by the formation of county units. Officers for the new year are: President, Ralph J. Barr, Troy; vice-presidents, L. G. Adams, Mobile, and W. B. Smith, Birmingham; secretary, T. R. Fields, Troy; and treasurer, L. J. Pake, Montgomery.

State Route is Selected—The route for the new state highway across central Minnesota was selected at a meeting of the Central Minnesota auxiliary of the National Parks Highway Association. The legislature will be asked for a stone crusher at the St. Cloud reformatory to provide stone for the road. The route is St. Cloud, St. Joseph, Avon, Albany, Freeport, Melrose, Sauk Center, West Union, Oakis, Alexandria, Garfield, Brandon.

Coming Motor Events

RACES

—1917—

May 19—Metropolitan Trophy, New York speedway.
 May 30—Indianapolis speedway.
 June 9—Chicago speedway.
 June 23—Cincinnati speedway.
 July 4—Omaha speedway.
 July 14—Des Moines speedway.
 July 28—Tacoma speedway.
 August 4—Kansas City speedway.
 September 3—Cincinnati speedway.
 September 15—Providence speedway.
 September 29—New York speedway.
 October 6—Kansas City speedway.
 October 13—Chicago speedway.
 October 27—New York speedway.

†A. A. A. championship events for 1917.

MEETINGS

Feb. 13-14—National annual convention of Pike's Peak Ocean-to-Ocean Highway, St. Joseph, Mo.

SHOWS

Feb. 3-10—Minneapolis.
 Feb. 8-10—Bangor, Me.
 Feb. 5-10—Indianapolis.
 Feb. 10-17—San Francisco.
 Feb. 10-17—Hartford, Conn.
 Feb. 12-17—Kansas City.
 Feb. 12-17—Louisville, Ky.
 Feb. 12-17—Nashville, Tenn.
 Feb. 13-16—Grand Forks, N. D.
 Feb. 13-16—Fargo, N. D.
 Feb. 13-17—Williamsport, Pa.
 Feb. 13-17—Sioux City, Ia.
 Feb. 14-17—Peoria, Ill.
 Feb. 19—Pittsfield, Mass.
 Feb. 19-24—Bridgeport, Conn.
 Feb. 19-24—Des Moines, Ia.
 Feb. 19-24—Duluth, Minn.
 Feb. 19-24—Grand Rapids, Mich.
 Feb. 19-24—St. Louis.
 Feb. 19-24—Syracuse.
 Feb. 20-24—Salt Lake City, Utah.
 Feb. 21-23—Dodge City, Kan.
 Feb. 21-24—Bloomington, Ill.
 Feb. 21-24—Flint, Mich.
 Feb. 24-March 4—Atlanta, Ga.
 Feb. 26-March 3—Omaha, Neb.
 Feb. 26-March 3—Great Falls, Mont.
 Feb. 26-March 3—Utica, N. Y.
 March 1-3—Urbana, Ill.
 March 3-10—Boston.
 March 3-10—Washington, D. C.
 March 5-10—Bridgeton, Conn.
 March 6-10—Fort Dodge, Ia.
 March 7-10—St. Joseph, Mo.
 March 14-17—Davenport, Ia.
 March 14-17—Mason City, Ia.
 March 18-23—Cedar Rapids, Ia.
 March 19-24—Cedar Rapids, Iowa.
 March 27-31—Deadwood, S. D.
 April 4-7—Stockton, Cal.

Evanville, Melby, Ashby, Dalton, Fergus Falls, Elizabeth, Rothsay, Barnesville, Moorhead to Fargo.

How Much Did You Use?—Oklahoma motorists used more than twenty million gallons of gasoline in 1916. At an average price of 18 cents the sum of \$3,618,225 was spent in this way.

May Substitute Coal Gas—Experiments are under way in England to drive motor omnibuses with coal gas. The gas is carried at low pressure in bags strapped to the roofs of the omnibuses.

Atlantic City to Have Show—One of the first spring motor car shows will open in Atlantic City March 31 to last until April 14. The show will be held on the Garden pier under the management of S. W. Mogill.

Cars in Canal Zone—Motor cars licensed for operation by private owners in the Canal Zone at the end of 1916 reached 223. In addition, 166 residents of Panama and Colon have reciprocal licenses, which allow them to drive in the Canal Zone.

Hartford Mayor to Open Show—Mayor Frank A. Hagarty will open the Hartford, Conn., show Feb. 10. Mayors of nearly all the cities in Connecticut are expected at the opening. All space has been sold. Pleasure cars and trucks will be shown on the main floor, and accessories in the galleries. Adjutant-General George M. Cole and staff and Colonel Richard J. Goodman, commanding the first infantry, and his staff will inspect the exhibition that night.

Honduras Gets Motor Truck—The first motor truck seen in Ceiba, Honduras, if not on the entire north coast of Honduras, arrived from New Orleans recently to be used by an ice manufacturer. As makers of motor cars have been actively trying for some time to introduce motor-delivery cars on this market, the arrival of this truck is something of an event. There is an opportunity for truck sales to the plantation owners. The planters, however, are quite skeptical on this point, believing the trucks would mire in wet weather.

Transport Train Run Planned—To demonstrate the utility of the William Penn highway through Pennsylvania the war department of the United States in May or June will send a transport train from Easton to Pittsburgh. The train will consist of several motor trucks and armored guns, such as have been in use on the Mexican border since last summer. An effort will be made to break time records for trucks across the state. On the return trip from Pittsburgh the route from Reading eastward will be through Philadelphia instead of Easton.

Association Meets at Kalamazoo—The Michigan-Detroit-Chicago Highway Association held its annual meeting at Kalamazoo, Mich., Feb. 5. Among the speakers on the program were Mayor Marx of Detroit; W. C. Edens, chairman of the good roads committee of the Chicago Association of Commerce; Dr. Charles McKenna, president of the Michigan State Normal College; W. S. Gilbreath, secretary of the Detroit Automobile Club; F. F. Rogers, state highway commissioner, and Philip T. Colgrove, president of the Michigan Good Roads Association.

Ontario Would Examine All Drivers—The Ontario department of highways, Toronto, Canada, wants to have examination of all motor car drivers required and is starting with professional drivers, who heretofore have been compelled to pass an examination and obtain a certificate. The certificates are to be known as operators' certificates in the future instead of chauffeurs', and it is expected that drivers other than the professionals will take the examination to possess the certificate, which will be of value in case of accident that might otherwise point to lack of driving skill.

After two days of conference there was a banquet at which more than 100 dealers were present.

Poundstone Heads K. C. Branch—L. A. Poundstone has succeeded C. B. McLaughlin as manager of the Maxwell branch at Kansas City. Mr. Poundstone was formerly at the factory.

Belmont Opens Temporary Office—The Belmont Motor Car Co., Toledo, Ohio, has rented temporary quarters while awaiting its factory and office buildings. The company expects to be ready to produce cars by March 1.

Canadian Agency for Lansing Concern—The Copeland Motor Sales Co., Windsor, Ontario, has been appointed Canadian distributor for the starting and lighting system manufactured by the Detroit Electric Welder Co., Lansing, Mich.

Olds Will Develop Park—The Olds Motor Co. is to develop a 40-acre park for the benefit of Lansing, Mich., citizens, by converting what is now a waste stretch of land into tennis courts, ball fields, playgrounds and resting places.

Dealers Auction Used Cars—Dealers at Worcester, Mass., have tried the auction plan of disposing of used cars, and they found it so successful similar auctions are to be held every three or four months. More than 100 cars were sold in two days at the first auction, and more than 600 buyers attended.

Schott Heads Amazon Tire Co.—L. J. Schott has been elected president of the Amazon Tire & Rubber Co., Akron, Ohio. Other officers are: Vice-president, L. F. Smith, and treasurer, C. E. Bettler. The company reports an increase in sales of 140 per cent each month since the plant began operation.

Woodenware Plant Makes Tires—The Samuel Cupples Woodenware Co., St. Louis, a large manufacturer of woodenware and paper products, is making handmade motor car tires and inner tubes. For several years the company has had a rubber factory for fruit jars rings and other small specialties, but this is a new departure.

Books Foreign Orders for Tractor—The John Ladson Mfg. Co., New Holstein, Wis., which marketed a general utility tractor several months ago, has booked orders since Jan. 1 for nearly 500 machines for export. Shipments will be made to Spain, England, Russia, Norway, Australia, Denmark, Cuba, France and other nations.

Zettler Appoints Chicago Distributor—The Zettler & Lamson Motor Truck Co., Chicago, which will move its plant and offices to Waukegan, Wis., as soon as the proposed new factory group is ready, has contracted with the Racine Wagon & Carriage Co., Chicago, for distributing its output in the Chicago territory. The district has been divided into

twenty divisions, each in charge of a salesman. The same plan will be used in other large centers.

Innes Resigns from Dodge—H. L. Innes has resigned from Dodge Bros. to become factory manager of the Chevrolet Motor Co. at Flint, Mich.

To Make Motor Car Parts—W. Brummeler & Sons, Grand Rapids, Mich., have started erection of a plant for the manufacture of hoods, fenders, gas tanks and other metal parts for motor car makers.

New Office for Silvev Co.—The Silvev Co., South Bethlehem, Pa., maker of Bethlehem spark plugs, will move its sales and advertising departments and general office force from the factory into a separate office building.

To Make Trucks Only—The Niles Car & Mfg. Co., Youngstown, Ohio, will stop making trolley cars soon and make motor trucks only, according to officials. Last year the company was working on 1- and 2-ton trucks. Soon it will offer 3½- and 5-ton trucks.

Sole Distributor for Miller—The Keller Engineering & Sales Service, Chicago and Philadelphia, has been appointed sole distributor of the Miller carburetor. Installation and service stations are being established for the convenience of motor car owners.

Overland Buys Land and Plant—The Willys-Overland Co. has purchased the ground and experimental plant of the Libbey-Owens Sheet Glass Co., Toledo, Ohio, at a price in excess of \$165,000. The purchase was made in anticipation of further expansion of the Overland company.

Allen to Build Community—The Allen Motor Co., Fostoria, Ohio, plans the construction of a motor car community on about 150 acres near its factory on the outskirts of the town. Building sites and streets have been laid out, and the new addition is to have all modern improvements. It will be called Allendale Addition.

Lamson Truck Reorganizes—The Zettler & Lamson Truck Co., Chicago, has reorganized as the Lamson Truck & Tractor Co. An addition to the factory has been completed, and additional space probably will be provided before the end of the year. The company has enlarged the scope of its business and has entered into a selling campaign for national and international distribution.

National Acme Elects—W. B. D. Alexander is the new president of the National Acme Co., Cleveland, Ohio. E. C. Henn is vice-president and general manager, and A. W. Henn is secretary and treasurer. A quarterly dividend of 1½ per cent was declared, payable March 1. The earnings are said to be at the rate of 27 or 30 per cent. The capacity of the factory is to be doubled by the erec-

tion of a 6-acre plant. The stock is to be listed on New York and Cleveland stock exchanges.

J. W. Murray Mfg. Co.—The J. W. Murray Mfg. Co., Detroit, has increased its capital stock from \$500,000 to \$1,000,000.

Circus Buys Troy Trailers—The United States Circus Corp. has bought forty-six Troy trailers, which will be used for transporting employees, carrying equipment and animals which do not have to be caged.

Sterna Tire Remodels Factory—The Sterna Tire Co., St. Louis, has remodeled the Efficiency Oil Co. plant, which it owns, and has installed new tire machinery. The concern expects to turn out 1200 Stearnwear tubes daily after Feb. 15.

N. Y. Mitchell Territory Extended—The Mitchell Motor Car Co. of New York has taken over the wholesale as well as retail distribution of Mitchell cars in Eastern territory. This includes Manhattan, Brooklyn, Long Island and a part of New York state, New Jersey and parts of Massachusetts, Connecticut, Delaware and Maryland.

Williams Gets Klaxon Appointment—H. R. Williams has been appointed sales engineer and manager of the Detroit office for the Klaxon Co., Newark, N. J. Mr. Williams was with the Westinghouse Co. for several years and more recently was manager of the Gibson Co., in Indianapolis. He comes to the Klaxon company from the Chanslor & Lyon Co. of the Pacific coast.

Parker Again Heads Rust Proof—Clark W. Parker has been re-elected president of the Parker Rust Proof Co. of America, Detroit, and Wyman C. Parker has been re-elected secretary-treasurer and general manager. J. G. Johnson was elected vice-president; E. C. Hoelsie, assistant treasurer; W. M. Cornelius, assistant secretary; and L. Hulbert, comptroller.

Field Motor Co. Formed—The Field Motor Co. has been organized at Grand Rapids, Mich., with a capital of \$500,000 to manufacture a motor invented and patented by E. A. Field. The company has bought a building for a plant. The motor is designed for tractors. The officers are: President, E. A. Field; vice-president, J. Sehler; secretary, A. M. Noorthock, and treasurer, J. P. McVain.

United Motors May Buy Appliance—The United Motors Co. has made a provisional purchase of the shutter patents held by the Detroit Motor Appliance Co., which is now used by the Harrison Mfg. Co. in its manufacture of radiators for Hudson and Columbia cars. The United Motors Co. is investigating the validity of the patents. The Detroit Motor Appliance Co. is retaining the right to make these shutters for Ford cars.

Canton, Ohio—Hydro Motor Car Co.; capital stock, \$100,000; to manufacture hydro motor cars; incorporators, Ralph E. Hay, James P. Snider, Harry O. Myers, Harvey N. Pattison and Edward N. Kauts.

Cleveland, Ohio—L. R. Carpenter Motor Co.; capital stock, \$10,000; to sell motor cars; incorporators, Lee Royal Carpenter, E. W. Carpenter, H. Swenson, H. L. Hitchcock and F. T. Cullitan.

Cleveland, Ohio—Master Motor Car Co.; capital stock, \$200,000; to manufacture motor cars; incorporators, Alfred Whitworth, Milton R. Blodum, Fred C. Theuer, Perry J. Eubanks and S. J. Kornhauser.

Cleveland, Ohio—Euclid Auto Sales Co.; capital stock, \$15,000; to sell motor cars; incorporators, H. E. Saunders, A. T. Fitzgerald, Edward Bushnell, H. B. Altman and Edward J. Cherney.

Cleveland, Ohio—Prospect Auto Top & Painting Co.; capital stock, \$20,000; to manufacture motor car tops; incorporators, John Meyers, L. B. Horstman, R. F. Horstman, Charles W. Reppert and L. M. Butler.

Cleveland, Ohio—Polberth Auto Specialty Co.; capital stock, \$10,000; to sell accessories; incorporators, Fred G. Polberth, William M. Polberth, M. C. Brown, L. F. Adler and William F. Kees.

Cleveland, Ohio—Pulford Auto-Top Co.; capital stock, \$25,000; to manufacture tops; incorporators, J. W. Pulford, H. E. Durbin, E. A. Pulford, Cora Pulford and Wayne Eberley.

Cleveland, Ohio—Vincent Bros. Auto Sales Co.;

Recent Incorporations

Columbus, Ohio—Carroll-Ford-Edgar Motor Co.; capital stock, \$10,000; to sell motor cars; incorporators, R. L. Tolben, H. W. Lower, Perry D. Caldwell, D. L. Schwab and J. R. Robinson.

Columbus, Ohio—Carroll-Ford-Edgar Motor Co.; capital stock, \$10,000; to sell motor cars; incorporators, W. E. Carroll, H. F. Ford, H. L. Edgar, John W. Glass and N. Bales.

Dodge City, Kan.—Auto Supply Co.; capital stock, \$20,000; incorporators, T. H. Spaulding, Jr., A. J. Jackson and Irene B. Jackson.

Eau Claire, Wis.—Kinney Motor Car Co.; capital stock, \$50,000; to deal in new and used cars; incorporators, Ole G. Kinney, W. J. Moe and C. A. Kinney.

Marion, Mo.—Reichel Motor Co.; capital stock, \$40,000; incorporators, Theodore Reichel, John W. Hutton and D. W. Acute.

Mansfield, Ohio—Motor Car Sales Co.; capital stock, \$10,000; to sell motor cars; incorporators, Frank H. Reed, Wm. F. Forest, Dimon Herring, LeRoy Herring and Edwin G. Slough.

Milwaukee, Wis.—Kuns Wheel Co.; capital stock, \$100,000; to manufacture resilient steel wheels for motor vehicles; incorporators, John L. Kunz, H. S. Cantrovitz and H. D. Towney.

Milwaukee, Wis.—Olympian Motor Sales Co.; capital stock, \$10,000; to deal in new and second-hand cars, operate garage, etc.; incorporators, Emmet Moran, Jr.

Seymour, Wis.—Service Auto Co.; capital stock, \$20,000; to operate a garage and repair shop, sell new and used cars, trucks, etc.; incorporators, L. H. Waite, William Beck and August Holtermann.

Toledo, Ohio—Nickels, Jackson & Lavenburg Co.; capital stock, \$25,000; to sell motor cars; incorporators, Howard Lewis, Frank M. Hackett, Ellery G. Bean, E. H. Watson and S. A. Carter.

Warwick, Ohio—Sterling Rubber Mfg. Co.; capital stock, \$25,000; to manufacture rubber articles; incorporators, William H. Harter, Leonard Y. Croft, Mary R. Rhoads, Mary R. Harter and Joseph A. Whittear.

Youngstown, Ohio—Mahoning Kissel Kar Co.; capital stock, \$10,000; to sell motor cars; incorporators, M. H. Farish, D. C. Farish, W. B. Stickler, Oscar A. Stephens and M. J. Grimes.

MOTOR AGE

Make Your Motor Age

Just One—Not Two

When you buy a new motor, you want to be sure it's the right one for your car. That's why you should look for the Motor Age label on the motor. It tells you exactly what you need to know about the motor's performance, and it's the only label that does. So when you buy a new motor, look for the Motor Age label. It's the only label that tells you exactly what you need to know about the motor's performance.

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1. **Introduction**
 2. **Background**
 3. **Methodology**
 4. **Results**
 5. **Conclusion**
 6. **References**



100





THE NEW YORK STATE DEPARTMENT OF CORRECTIONS AND JUVENILE JUSTICE

The New York State Department of Corrections and Juvenile Justice is the largest and most complex of the State's executive departments. It is responsible for the custody, care and rehabilitation of the State's prisoners and for the supervision of the State's juvenile delinquents.

The Department is organized into three main divisions: the Division of Correction, the Division of Juvenile Justice and the Division of Prisoners. The Division of Correction is responsible for the custody and care of the State's prisoners, while the Division of Juvenile Justice is responsible for the supervision of the State's juvenile delinquents. The Division of Prisoners is responsible for the management of the State's prisons.

The Department is headed by the Commissioner of Corrections and Juvenile Justice, who is appointed by the Governor of the State. The Commissioner is assisted by the Deputy Commissioner, who is also appointed by the Governor. The Department is also assisted by a number of other officials, including the Chief of Staff, the Chief of Administration and the Chief of Finance.

The Department is responsible for a wide range of activities, including the custody and care of prisoners, the supervision of juvenile delinquents, the management of prisons, the provision of medical and dental services, the provision of educational and vocational training, and the provision of other services to prisoners and juvenile delinquents. The Department is also responsible for the collection and management of the State's funds, and for the payment of the State's debts.







the 1990s, the government has been unable to pay its bills, and the country has been plagued by corruption and mismanagement. The government has also been unable to pay its bills, and the country has been plagued by corruption and mismanagement.

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Chlorine: The Story









Figure 1. A wide, flat landscape, possibly a field or a beach, with a dark, silhouetted structure or person in the distance under a light sky.





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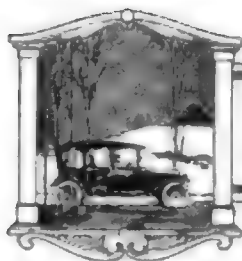
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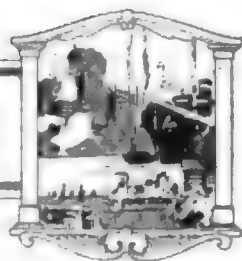
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EDITORIAL PERSPECTIVES



Aviation and the Motorist

TO those of us who have been fortunate enough to have had the opportunity to visit the Pan-American Aeronautic Exposition in New York last week there has come a new insight into the possibilities of this newest phase of motoring—motoring in the air—and a broader view of what the internal combustion engine—the gasoline engine, if you please—means to humanity as a whole. Perhaps the international developments of the last two weeks have made us more appreciative of the airplane as a very strong factor in national defense. But, granting this function of aviation, a view of what has been accomplished in the development of heavier-than-air machines during their years of existence since the Wright brothers first tried the wings of their man-made fledgling opens our eyes to its broader possibilities in the art of rapid communication and quick transportation in times of peace.

■ ■

ESTABLISHMENT of inter-city mail routes with the possibility of later development into regular service of inter-city transportation of passengers has been seriously proposed and is being as seriously investigated by our government. The postal authorities, in particular, have expressed themselves as impressed with its possibilities, and the actual establishment of aerial postal service between Chicago and New York and intermediate cities now awaits only the proper commercial arrangements and the business details incident upon the development of any transportation system.

■ ■

SO far as the actual engineering connected with the construction of the machine itself goes, this may be conceded to be complete, or sufficiently complete to assure a practically uninterrupted mail service. Aside from the commercial and financial features, the culmination of this dream awaits only conditions such that American airplane builders and aviation engine builders can turn their attention to the needs of peace and

away from the insistent demand of our own government and the belligerents in Europe.

■ ■

ONE of the features which has been brought out most forcibly is the fact that the aviation engine is most closely akin to the motor car power plant. The idea persisted for a long time in Europe that the aviation engine must be something quite different in design and construction from that needed for land use. It was believed that the high-speed type, such as used in the racing car engines, could not be built as light for its power as some thoroughly original design. From this were developed the Gnome, Anzani and many other aviation special engines. During the war, with the aeroplane put to real work, it has been found that the engine which is fundamentally a racing car motor, except that it is larger and more expensively made, is giving far better service than the older designs developed exclusively for aeronautic work.

■ ■

THERE is one difference, however, and that is in the trend of development as between the aviation engine and the motor car power plant. While the tendency for the last several years in motors for land vehicles has been toward smaller and smaller cylinders and in general toward engines as a whole of lower capacity, the development in aviation engines has been toward larger sizes. Three years ago an engine of 120 hp. was very nearly the maximum. Now, horsepowers between 200 and 300 are a rule, and the demand of naval and military buyers is for still greater power. Even with this increase in power the engines have become lighter per horsepower and now the European military authorities will not consider an engine that weighs more than 3 lb. per horsepower, exclusive of the water. These engines, it is true, operate with higher compression than do the motor car engines, usually over 100 lb. per sq. in., as compared with the 60 to 80 lb. compression common in motor car engines. Most of them also use an aluminum alloy cylinder with a steel or cast-iron liner for the sake of lightness.

Destruction of Our Beauty Spots

INROADS of rapacious commercial enterprises upon the native beauties of this country a few years ago were such a menace to the natural attractions of the United States from a scenic standpoint and also from the standpoint of our permanent prosperity that farsighted men with a higher purpose than that of immediate gain brought sufficient pressure to bear upon the Federal Government that certain sections were withheld from commercial exploitation. These men we have to thank for our national parks and monuments.

■ ■

THAT the danger is not less than it was at that time is evidenced in the recent attempts of some of the power companies to exploit certain of the streams in the Sierra Nevada mountains for power purposes. Certain power companies are attempting to obtain permits from the Department of the Interior under the guise of irrigation, which will not only destroy the beauty of the only waterfalls of any magnitude on the eastern slope of the Sierra Nevada but will result in the destruction of the irrigation of approximately 90,000

acres of proved arable land in Mona Lake valley, most of which is on the public domain subject to location under the desert land act and is capable of supporting a large population. From a scenic standpoint it will result in the destruction of two of the most magnificent of California waterfalls situated at the eastern gateway of the Yosemite valley and known as Silver Lake and Leevining falls, the latter being one of the most wonderful of the beauty spots along the new Tioga road, regarding which so much has been said.

■ ■

NEXT WEEK—TRACTORS

Few realize to what an extent the gasoline engine and its newer sister, the kerosene motor, have become part and parcel of the every-day business of farming and heavy hauling in general. No more striking evidence of the rapid development of the tractor has been offered than the tractor exhibition this week at Kansas City. One of the features of MOTOR AGE for Feb. 22 will be a thorough resume of the tractor field at present and in prospect.

TO prevent this grabbing of the public domain a bill has been introduced in Congress asking that the boundaries of the Yosemite National Park be extended to include these water powers and thus reserve to the use of the nation some of the greatest scenic attractions of that territory. This is of particular importance to motorists since the Yosemite park has become accessible to such an extent motorists can afford to consider it a regular touring ground. It is to their gain to have its beauty spots preserved.

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RESEARCH OF THE MATHEMATICS

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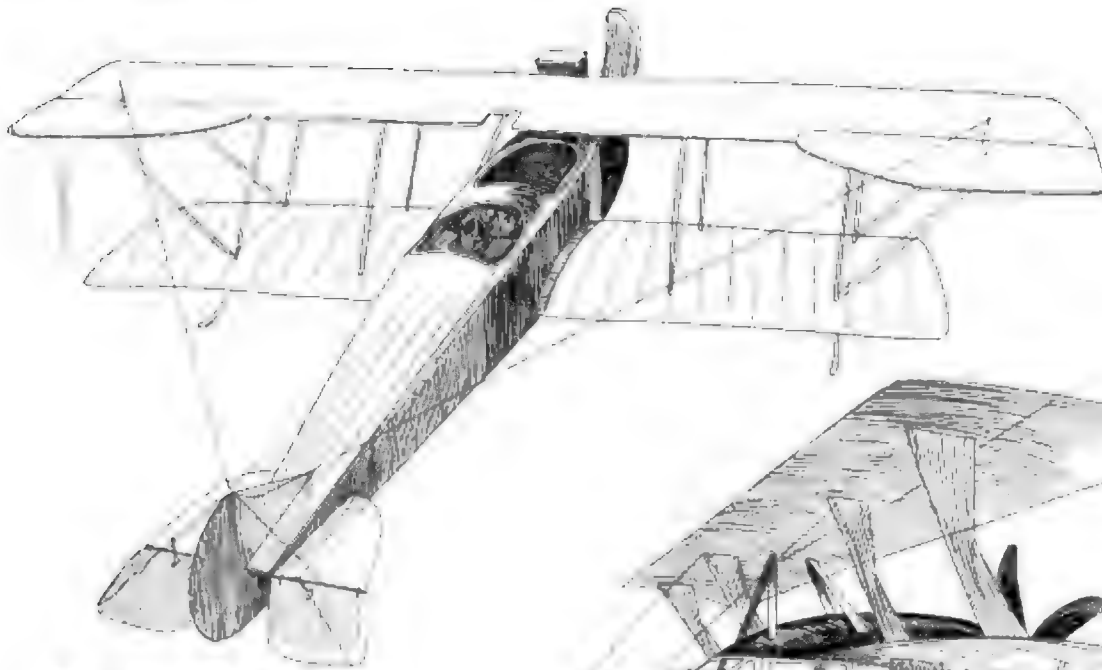


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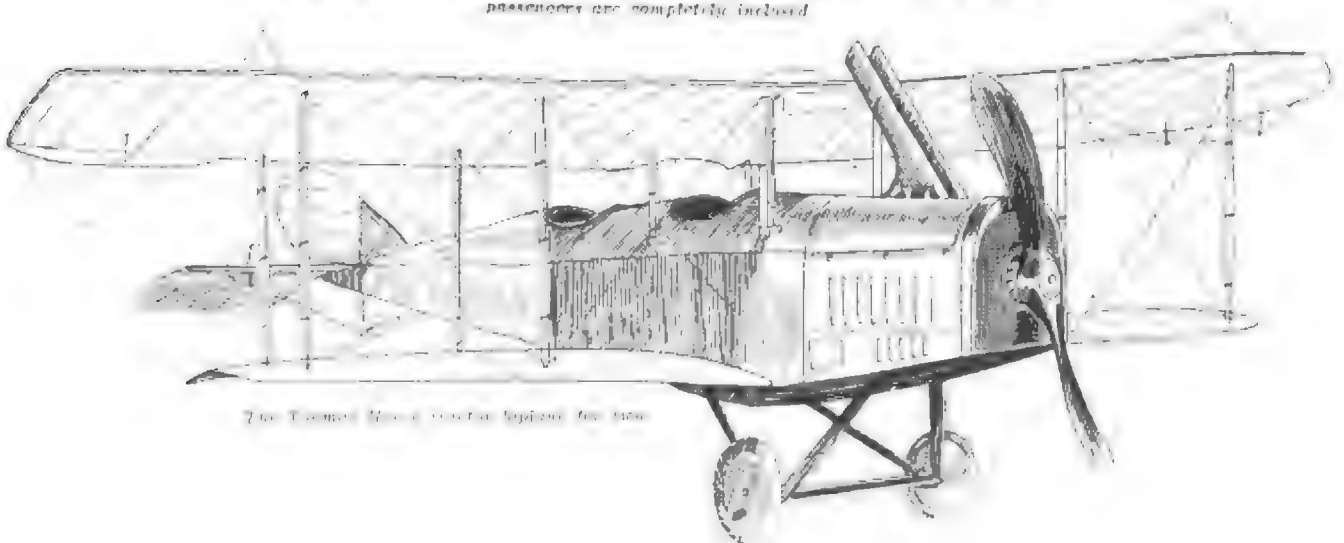




The Wright-Martin tractor biplane



Curtiss idea of an air car. A complete motor car with triple planes. Driver and passengers are completely included



The Thomas-Morse tractor biplane for 1916







swing up the aileron on one end the opposite one is swung down. The Wrights discovered this method of control and patented it. Instead of using a hinged part they bent the wing up or down, which accomplished the same result.

There are two other control features. One is the rudder. It calls for no explanation, being the same as in a steamboat and being located at the rear or often as a part of the tail of the fuselage. At either side of the rudder on many planes is a horizontal planette—a very small plane. This is the elevator and is used to make the machine go up or down. If you slope the elevators down in front you send the airplane up and vice versa. These three essentials, ailerons, rudder and elevators, are the A B C of airplane control.

Airplane prices have not yet invaded the realm of Ford cars; in fact, it is difficult to find one for less than \$4,000, and you can easily spend \$12,000 for a new model. The question of price suggests what is the immediate and what the remote future of the airplane. Not being a prophet or the son of a prophet we shall only re-echo the midday dreams of those most interested in the art.

Only Buyers at Present

At present our Government and European governments are the only buyers of aircraft. Our Government has appropriated \$50,000,000 for airplanes, hydroplanes and all that goes with them. Think what a plum this is with only one concern really making complete planes. Imagine what \$50,000,000 would have meant to the motor car industry in 1900, when a few of our pioneers were building one- and two-cylinder types. It is equally hard to imagine what \$50,000,000 means to airplanes today. It should prove highly stimulating and very attractive.

Our Government wants plenty of planes. France has more than 20,000 to-day, and rumors are that Washington want 10,000. Washington has one more chance of getting that many this year than she has of getting 10,000 moons. Our output may be twenty to thirty a month. It would not be hard to put motor production up,

DETAILS OF AMERICAN AVIATION ENGINES

MAKER	HP.	B. & S.	R. P. M.	CYLS.	NO. CARBS.	NO. MAGS.	VALVES	PROPELLER SPEED	MATERIAL PISTON
Duesenberg	400	4 1/2 x 17	2100	12-V	2	2	10	Direct	Alum. alloy
Duesenberg	70	4 1/2 x 17	1500	4-Vertical	1	1	10	Direct	Alum. alloy
Packard	225	4 x 16	1500	12-V	2	2	10	Direct	Alum. alloy
Trebert	150	4 x 14	1500	16-Revolving	1	2	10	Direct	Magnalite
Frederickson	70	4 1/2 x 14	1000	8-Revolving	1	1	2-cycle	Direct	Cast iron
Wisconsin	150	5 x 16 1/2	1500	6-Vertical	1	2	1-head	Direct	Alum. alloy
Wisconsin	300	5 x 16 1/2	1500	12-V	4	2	1-head	Direct	Alum. alloy
Guome	100	4 x 16	1200	9-Revolving	1	1	1-head	Direct	Alum. alloy
Knox	300	4 1/2 x 17	1800	12-V	2	2	1-head	Direct	Alum. alloy
Ansaal	220	4 x 15	1200	20-Circular	2	2	1-head	Direct	Alum. alloy
Roberts	105	5 x 15 1/2	1300	6-Vertical	2	2	1-head	Direct	Cast iron
Thomas-Morse	135	4 x 15 1/2	1200	8-V	1	2	1-head	Direct	Alum. alloy
Aeromarine	100	3 1/2 x 15 1/2	2300	8-V	1	1	1-head	Direct	Alum. alloy
Curtiss	90	4 x 14	1400	8-V	1	1	1-head	Direct	Alum. alloy
Curtiss	100	4 1/2 x 15	1400	8-V	1	2	1-head	Direct	Alum. alloy
Curtiss	200	5 x 17	1400	9-V	2	2	1-head	Direct	Alum. alloy
Curtiss	300	5 x 17	1400	12-V	2	2	1-head	Direct	Alum. alloy
Wright-Martin	150	4 7/2 x 15 1/2	1450	8-V	1	2	1-head	Direct	Alum. alloy
Wright-Martin	75	.....	.....	4-Vertical	1	2	1-head	Direct	Alum. alloy
Hall-Scott	150	.....	1875	6-Vertical	1	2	1-head	Direct	Alum. alloy
Sturtevant	140	4 x 15 1/2	2000	8-V	1	1	1-head	Direct	Alum. alloy
Pierce	35	4 x 16	.....	3-Radial	1	1	1-head	Direct	Alum. alloy

but it will be hard to get enough parts.

At present our Government has nearly 100 planes in flight service, as compared with twelve a year ago. It hopes to have several hundred in a few months, but it is very hard to get delivery, as there is so much delay in delivery of materials there is a hopeless lack of standardization in small parts, which makes the procuring of them very near impossible.

We also are suffering from a famine of qualified aviators, and reports of salaries ranging from \$75 to \$200 a week for expert aviators are floating around the show. Not more than 650 licenses have been granted to aviators since the inception of the art and of this number many are not available or suitable for present-day service.

According to figures given out by aviation schools it is no cinch to become an aviator. There is a little more luxury attached to it than becoming a chauffeur. One school gives lessons at \$25 each, and it takes a couple of dozen to get the necessary diploma. Three months or six months may be consumed in the course. In France the training course at several of the large military schools is six months. Some of our men have had to take courses of three months in France before being given their army certificate.

As to the possible future of airplaning much speculation exists. One enthusiast predicts that in a few years Erie, Pa., will have 400 hydro-planes and that business men will use them. With this as a nucleus of reasoning, we might compute the air soon being as filled with machines as it is with sparrows, swallows or black birds. As yet, aviation seems to lack the practical touch, except for army and many uses. But the time soon may come when we will have main air mail routes.

Aerial Mail Service

Why should Chicago not have airplane mail routes to Milwaukee, Wis., Detroit, Minneapolis, Minn., St. Louis, Mo., Indianapolis, Ind., and perhaps Cincinnati, Ohio. With special mail service at 100 m.p.h. you could crowd into one business day correspondence that has formerly spread over two or three. For example, a letter from Detroit is in the Chicago office for you at 9 a. m.

If there is a Detroit aerial mail at eleven your letter will be in the Detroit motor car factory at 2.30 when the president returns from lunch and an answer will be in your office the next morning. That would be good mail service for a 275-mile trip. With higher speeds the trip can be made in 2 hrs.

SPECIFICATIONS OF AMERICAN AIRPLANES

MAKE	TYPE	WING SPAN UPPER LOWER GAP CHORD				CARRYING CAPACITY	LIFTING CAPACITY	PROPELLER	CONTROL	PRICE	MOTOR	MISCELLANEOUS
Benoit	Bi-Flying Boat	46'	46'	5'	6'	2200	550	1-Push. Dep.	.....	\$6,500	Roberts 100 hp.	2 radiators; 1 each side of motor
Thomas-Morse	Military Tractor Bi-Plane	52'9"	34'	5'3"	5'	2150	700	1-Tract. Dep.	.....	.....	185 hp.	in planes
Cooper	Bi-Flying Boat	33'	22'	.....	4'6"	.....	.....	1-Push. ....	.....	4,000	70 hp.	Flexible wings; Sea-able control surface
Aeromarine	Bi-Plane	41'	31'	5'	.....	1900	700	1-Tract. Dep.	.....	9,000	100 hp.	.....
Curtiss	Military Tractor	43'6"	34'	5'	5'2"	1890	485	1-Tract. Dep.	.....	.....	90 hp.	Curtiss
Curtiss	Bi-Flying Boat	45'2"	35'2"	5'2"	5'11"	2100	660	1-Push. Dep.	.....	.....	100 hp.	.....
Curtiss	Tri-Plane	40'	40'	5'	.....	2450	1450	.....	.....	.....	.....	.....
Burgess-Dunne	Bi-Seaplane	46'	40'	5'	5'3"	2400	900	1-Tract. Dep.	.....	.....	100 hp.	Roberts
Wright-Martin	Bi-Military Tractor	29'	29'	5'3"	5'9 1/4"	1725	915	1-Tract. Dep.	.....	.....	150 hp.	Hispano-Suiza
Wright-Martin	Bi-Tractor	50'7"	50'7"	.....	.....	1905	983	1-Tract. Dep.	.....	.....	150 hp.	Hall-Scott
Pierce	Bi-Plane	26'	20'	5'6"	5'6"	850	250	1-Tract. Dep.	.....	3,000	35 hp.	.....
Wittebmann	Bi-Military Tractor	42'	42'	5'6"	5'6"	1375	600	1-Tract. Dep.	.....	.....	90 hp.	Hall-Scott

*Seven-passenger

Traffic Signals

Make Them Alike!

Says Writer, Speaking After Two Years of Research

DENVER, Colo.—Editor *MOTOR AGE*—In your issue of Jan. 18 we note that M. E. Ash has written quite extensively in regard to traffic signals for motor cars, and in the main, we agree with him. There is no doubt that the traffic signal is a coming necessity, and that every city will have ordinances requiring the installation of signals, if not on all cars, on those that are inclosed, such as electric, limousines, winter and town cars, also on those that shut in with curtains.

It is very advisable that the subject be discussed from all angles, and some type of signal designated as a standard, that will be all that a signal should be, and one that the price is so nearly even with its intrinsic value, that the motorists will not rise in arms and throw the weight of their influence, which is the strongest power in any city, against the use of any and all signals.

Traffic Signals for Protection

It must be conceded at the very start, that traffic signals are for the protection of one motorist against another, and that the pedestrian is not in any way interested in such signals, as it is easier for him to look into the face of the driver and receive a nod or slight hand motion which will indicate which way he intends to turn. Furthermore, the traffic officer at street intersections has no interest in mechanical signals, for he has no time to note such, as anyone will grant, if the officer is watched for a few minutes while the traffic is heavy and coming fast. No signal will ever come into general use where traffic officers are stationed, for the very simple reason that every motorist is under the absolute control of the officers at that time.

Mr. Ash is evidently not conversant with the various actions wherein the use of traffic signals has been recommended for all vehicles, the position of such signal definitely defined as the left rear fender, and no other place, at least 50 ft. visibility, and further, that councils throughout the country pass ordinances requiring the use of traffic signals.

Complexity Bars Use

Also the Safety First Society of New York City, tried out six of the best models obtainable, and they were good mechanically, on the streets of New York, and found that their use as direction signals could not be recommended, on account of their complexity and the great liability of drivers to give a wrong signal, especially at night.

As long as people are fallible, and will remain so indefinitely, any and all signal makers may as well take cognizance of the fact, and so design their various signals, that no one can by any possibility, or under whatever stress of circumstances, or through nervousness or inattention, give a signal that may indicate a movement other than the one the driver really intends to make. All drivers will tell you that they drive automatically, excepting, of course, beginners, and it is very easy automatically to press any one of a number of buttons, and maybe the signal given will tell what he wants it to, and maybe not.

For a moment consider the point of view of the motorist, who may be following another car. Now it makes no difference to him insofar as his own actions are concerned what the car ahead may do, turn, slow or stop, just so long as he knows that the car ahead is going to do something different from what it is now doing. He will slow up, go out of gear if necessary, and wait to see what that fellow is going to do anyway.

Signalling with Hands

With right-hand drives, and there are many of them on the streets yet, contrary to your belief, the driver holds out his right hand and makes a left turn, and the left-hand driver holds out his left hand and turns to the right, if indeed he gives any signal at all when turning to the right. Of course, most ordinances say he must hold out his hand in the direction in which he is going to turn, but the ordinances are not enforced, in fact should not be, for any arm or hand signal where the arm is extended inward will not be visible unless the car is open like an express wagon. In fact it seems that most ordinances had the express wagon in mind when they were formulated.

The St. Louis ordinance says a "straight" or "ahead" signal must be displayed when one intends to continue straight ahead, whereas any reasoning person ought to know that a car which is not turning is going to go ahead. What is needed is a warning that one is not going ahead, and let it rest right there, without trying to tell which way the turn will be.

Any signal that requires the special education of the public is going to fall down when Mr. Farmer comes to town or Mr. Tourist happens to drop in, and either of their cars can do me as much damage as any of the cars that never go beyond the city limits.

Many signals have been invented, some with merit as signals, some with much mechanical perfection, but any signal that is complicated in wiring, protected by glass that gets dusty, muddy, or reflects the glare of the sun or is put out of business by the chance snowball or rattles—deliver us from a rattle—or requires much expert attention is not going to get by for long. The signal that very modestly changes its wording from stop, slow, right, left, back or what not to something else, is not going to attract attention and will for that very reason become a source of danger. We know, for we have put this type of signal to the test.

Signals Should Be Automatic

The operation of the signal should be such that the two hands may be kept on the wheel, while turning, whether by push button under the thumb, under the foot, or knee, depending on personal choice. Those signals that work automatically from steering wheel turning or brake lever are likely to work too late to give the necessary time to following driver to get his car in control.

Mr. Ash is quite right when he mentions some fifty-seven different signals, as we know of about thirty already patented, and we have no doubt that some hundreds of inventors and philanthropists are right now working their brains, and spending their money on the models of "the one and only signal."

Writer Has Studied Subject

Not like Mr. Ash, we have ulterior motives in going into discussion of traffic signals, and be it known that we have put two years of careful research on the subject, looking at every angle, not only from the motorist's standpoint, but the pedestrian's, the dealer's, the traffic officer's, and the law. We are drivers, and know what is needed as well as what is superfluous. We are engineers, and can look to the mechanics of a signal. We are salesmen, and can see the dealer's end.

Our conclusions as to what a traffic signal should be, are expressed in but a few words: Simplicity, durability, neatness, a red flag, a red light, electrical control, freedom from derangements, rattles and breakage, reasonable price, and ease of installation. As to position, that has already been settled by the Federation. As to front signal, none is required, as a slight movement of the hand suffices. Any signal that can measure up to these requirements will give ultimate satisfaction, and will come into general use.—Edwin H. Roberts.

Makers Offer Plants

To Aid United States in Case of War Emergency

THAT the last few months have not been without their adjustment to the idea of preparedness has been manifested during this week and last by the behavior of the motor car industry. This has been exhibited principally in the attitude taken toward the present international situation and the possibilities of war. Business as a whole is standing behind the Government, and the motor car industry is standing with every readiness to step forward with its plants and other resources if they are needed.

The motor car industry already has been an important factor in developing that sentiment and planning so necessary if the United States is to meet the expected emergencies adequately. A hundred or more corporations volunteered the first week to give the service of their plants in case of war, and it is estimated that about one-fifth of these were plants directly concerned in the manufacture of motor cars. Many makers of both parts and cars are in touch with the military authorities and have more or less explicit arrangements, as they have already turned out motor car equipment for the Governmental army.

Makers Have 27,000 Plants

The Naval Advisory Board conducted an industrial census before the need of it was so apparent, and from this census we learned that 27,000 plants of various makers, including the motor car maker, were scattered through the states. Already Government orders have been placed for many trucks, and that part of the industry is concerned mostly with ability to care for the regular trade.

Howard E. Coffin, vice-president and consulting engineer of the Hudson Motor Car Co., is due much of the credit for the industrial census made by the Naval Advisory Board, with which he has been concerned for the last two years. He is a member of the Council of National Defense and has to do with the disposition of these various industries in respect to military requirements.

Much attention was directed to the motor car industry by the appearance at Washington of Henry Ford to offer the Ford Motor Co. plant for the Government's use without profit. Ford then stated that the plant could produce 1000 submarines and 3000 cars a day if necessary.

The Packard Motor Car Co. is prepared to make aeroplanes in any quantity needed. The Cadillac Motor Car Co. is ready to give its entire organization to Government service. The United States Rubber Co. has offered its forty-seven factories, and the B. F. Goodrich Co. has made a similar offer in regard to its 125 branches.

The Du Pont Powder Co. and other munitions and steel factories have volunteered. All the plants of the Studebaker Corp. at South Bend and Detroit have been placed at the disposal of the Government in case of war. The Studebaker plant employs 12,000 men and can produce transportation equipment for military forces in large quantities.

William Cramp & Sons Ship & Engine Building Co.; Gould Storage Battery Co.; General Electric Co. and others likewise made tenders of partial or complete submission to possible military emergency. The list includes many of the concerns that have been engaged in the manufacture of munitions on foreign contracts. The Aero Club of America, the Wilmington Motor Show Association and other societies were some of the first to offer services.

It is understood that Government officials are expecting the motor car industry to man the reserve corps that is being formed for the huge army transportation system now in contemplation. More applications are wanted by the authorities, and it is felt that those in important positions with concerns making automotive apparatus must decide among themselves which ones shall take their time away from usual work to avoid undue lack of attention to company business, which necessarily will be as important as service at the front.

PREPARES TO MAKE MUNITIONS

Detroit, Feb. 9.—The Hudson Motor Car Co. has received a small order for shells from the Government to enable it to put in sufficient equipment to train employees for such work in event of war. This, coming in close connection with the numerous offers made by the motor car makers to aid the United States in case of emergency, is clear evidence of the value which the industry will have to the country if it is drawn into war.

OVERLAND TO MANAGE AGENCY

Chicago, Feb. 10.—The Willys-Overland Co., Toledo, Ohio, has taken over the Overland Co. of Illinois, Chicago, and will operate direct the large Chicago sales territory. Joseph H. McDuffee, assistant sales manager of the company, is to be put in charge of the Chicago business for 6 months at least.

The change is made possible by the decision of Charles W. Price to retire as distributor of Overlands in Chicago and the surrounding territory and his request that the Willys-Overland Co. purchase his interest. Mr. Price's retirement is due to

health conditions and outside financial interests. McDuffee, who is to have active charge of the business, returns to Chicago as to a former home. He made a success here with the Stoddard-Dayton in the early days. He was later on the Pacific Coast for the Overland interests after a period with other lines. The present change in the Chicago agency, so far as it affects Overland affairs, is not so great as might be expected, as the Willys-Overland Co. always has been a large stockholder in the agency company, which has built a business so big as to make factory methods the best policy for handling it.

PAIGE-DETROIT EARNINGS

Detroit, Feb. 9.—A recent report of the Paige-Detroit Motor Car Co. shows it manufactured 12,456 cars in the period up to Nov. 25 as compared with 7749 cars for 1915 and 4631 for 1914. The total sales for the 10 months ending Oct. 31, 1916, were \$9,899,790.48 with a net income available for dividends of \$964,442.21. The total sales for 1915 were more than \$2,000,000 less, or \$7,471,033.37 with a net income available for dividends of \$609,775.87. The monthly turnover now almost equals the capitalization.

The capital of the company has been increased four times. In 1911 it was increased from \$100,000 to \$250,000; in 1915 to \$500,000; in May, 1916, to \$1,000,000; and in September, 1916, to \$1,500,000. One thousand dollars invested in the Paige company in 1913 would be worth \$36,988 now. The common stock market value of the present capitalization is \$5,887,500. The report was made by H. M. Jewett, president of the company, at the annual meeting.

SAXON DELAY SHORT

Detroit, Feb. 9.—The next week after its \$250,000 fire the Saxon Motor Car Corp. was assembling cars in leased property and mill sites were being obtained for the resumption of all production. The company had enough material on hand and was able to obtain the necessary machinery at once, so that the employees had in prospect only a short time of idleness.

The company is building a plant on the outskirts of Detroit and will hasten its completion, which was planned first for June 1, but which will probably be finished at a much sooner date now. The fire started in a repair shop and passed to the test repair room and farther into the factory. Two hundred cars were destroyed, in addition to the structures used for assembly purposes.

Minneapolis Marks Another Epoch

Interpreter of Great Northwest Industry Speaks in Record Show Week

By William K. Gibbs

MINNEAPOLIS, Minn., Feb. 10—Our Great Northwest; prolific of wealth and a fertile territory for the sale of motor cars! Figures are interesting only in proportion as they generate interest in the story they tell, but one cannot tell of the Northwest and its possibilities as a trade field without quoting figures and these figures necessarily are large — larger than those with which one has to deal in any other one locality of the country. Perhaps the best method of gaining a conception of the vastness of the Northwest is by personal visit, for visualizing miles and miles of wheat, corn, oats, barley, rye and flax fields without actual play upon the brain through the medium of the optic nerve usually belittles actual conditions.

Third Greatest at Least

Motor show week in Minneapolis each year marks an epoch in the industry and trade of the Great Northwest. Minneapolis shows have drawn thousands of dealers and tens of thousands of citizens of the territory served by the Twin Cities here during the second week of February for several years and the show itself has been looked upon as the most potential in the country with the possible exception of Chicago and New York. Circumstances over which the pulling power of the much improved and more extensive show of this year had no control kept many of the four or more million people of this territory away from the show. Boreas swept down from Medicine Hat early in January and left in his wake a blanket of snow such as never was seen in the vicinity of the Twin Cities in the last 40 years, while in other parts of the field which Minneapolis serves snows were equally heavy. Not until yesterday did people from the far-away sections of the Northwest succeed in getting here in any great numbers and some of them had been several days coming. Parts of Minnesota and the Dakotas have not seen a train for two weeks and roads leading to railroad stations were drifted to such an extent that in places 15-foot banks had to be dynamited in order to open even a semblance of traffic. Residents of the snow-bound sections are keen motor enthusiasts and have an indomitable will which knows no compromise. They simply must visit the Minneapolis show and will go to any means to get here.

Size Doubled This Year

The Minneapolis show practically doubled in size this year over last year. Previously the shows have been held in the Armory, but this building was found to be too small and arrangements were made this

year to use the Mazda Lamp factory building, recently completed but not put into use on account of a lack of machinery. This building has 119,000 sq. ft. of floor space, whereas the Armory has but 65,000. Three floors and the basement were occupied this year by the show and the exhibits numbered 238 as against 148 a year ago. Exhibitors of passenger cars increased from forty-eight last year to seventy-two this year, and the number of machines exhibited this year is 300 compared with 203 in 1916. Accessory exhibitors to the number of seventy-four displayed their wares this year compared with forty-eight last year. Thirty-six commercial car exhibits are made this year as against seven in 1916, and there are eight tractor exhibits this year where there were none inside the show proper a year ago. In connection with the show Minneapolis-made products were exhibited in a room adjoining the show, this occupying 13,600 sq. ft. of floor space.

Comparing the Minneapolis show with those of New York and Chicago, it is found to be only slightly smaller when the number of exhibits are considered and one has only to study the vast distributing territory into which the Twin Cities distribute motor cars to find the reason for a show of such proportions.

Crops Show Buying Prospects

Without being specific as to the richness of the states tributary to Minneapolis, the extent of which is difficult to grasp unless one motors over the prairies, the crop reports give a fairly good idea of the buying possibilities found in the rural residents of this vast territory of the Northwest. Among the leading industries of the Minneapolis trade territory are farming, dairying, wool-growing, live stock raising, manufacturing and iron mining. Every one of these are active. Wages paid laboring men have advanced materially since a year ago, particularly in mining and manufacturing. Estimates of wages paid in the Butte and Anaconda districts of Montana, alone, are placed at \$3,500,000 a month, and all or much of this money is put into circulation due to the high prices of living necessities.

The wealth of the Great Northwest this year, while perhaps not so great as last year, is staggering. Creameries pay farmers about \$30,000,000 a year for butter fat, while butter adds \$40,000,000 more. Receipts for live stock give farmers approximately \$30,000,000 a year and the poultry division is estimated to pay \$30,000,000

a year also. Estimates give the combined dairy and live stock receipts of Minnesota and the Dakotas as \$200,000,000 a year, and estimates of cash available from all sources last year put the figure at \$684,000,000, to which might be added the estimate by the Montana agricultural commissioner of \$94,936,090 as the crop value of 1916 for that state. In these four principal states the total crop of wheat, corn, oats, barley, rye and flax last year amounted to \$963,561,000 bushels by government estimate valued at \$555,572,000.

Figures Show Increase

Figures for the fiscal or official chamber of commerce year ended December 31, 1916, and showing comparison between 1915 and 1916 crops in Minnesota, follows:

	1916	1915
Wheat	170,208,650 bu.	169,981,820 bu.
Corn	500,733,690 bu.	14,880,260 bu.
Oats	49,467,830 bu.	21,924,230 bu.
Barley	43,852,130 bu.	23,538,400 bu.
Rye	6,890,650 bu.	5,210,190 bu.
Flaxseed	7,461,210 bu.	7,199,150 bu.
Flour shipped ..	21,300,994 bbls.	

Receipts of wheat in Minneapolis are approximately 11,000,000 bushels less for 1916 than 1915 and the total receipts of all grains were 1,000,000 bushels less in 1915 and 1916 crops in Minnesota. The following table gives the receipts of grain in Minneapolis market in 1916 as shown by the chamber of commerce report:

	1916	1915
Wheat	31,947,520 bu.	142,669,870 bu.
Corn	7,137,260 bu.	10,777,820 bu.
Oats	42,535,710 bu.	33,544,650 bu.
Barley	37,271,590 bu.	36,583,780 bu.
Rye	7,202,030 bu.	6,236,660 bu.
Flaxseed	8,797,460 bu.	6,148,970 bu.
Total	234,891,570 bu.	235,970,760 bu.
Flour	900,648 bbls.	756,638 bbls.

Financial Conditions Propitious

The financial condition of this great territory is reflected in the bank reports, and dealers from the various districts of this territory report that the small country banks are bulging with money which the farmers have received for their 1916 crops. Thus the field for the sale of motor cars of 1917 in the territory fed by factory branches and distributing agencies in Minneapolis is especially good; perhaps better than it ever was before. What is more the people are able to pay for the cars they buy, whereas in previous years it has largely been the policy of farmers to buy cars on time, which necessitated the dealers converting their notes into money at the bank. It is not so long ago that some of the smaller farmers found themselves unable to pay even interest and taxes on their property, but the banner crop years of 1914, 1915 and 1916 have enabled them not only to pay off all taxes and interest charges but to pay for the land as well and leave them a comfortable bank balance.

While averages may not be taken as the criterion of what every farmer in this territory earned last year, it offers an interesting study. The census shows approximately 430,000 farmers in the territory handled by Minneapolis with an approximate total gross income for last year of \$779,000,000, which would give each an average income of slightly over \$1,800. One-half of these farmers now own motor cars and the other half are fertile prospects for the sale of cars this year.

Northwest Car Diminishes Distance

Farms in the Northwest cannot be compared with the farms of Illinois, Indiana and Ohio. The Northwest is a territory of great distances and the motor car is a dominant factor in diminishing distance. It has removed barriers hitherto considered impenetrable and proved a worth-while factor in educational, social and commercial progress. No better example of the interest with which the Northwestern farmer holds the motor car is found than in the energy which they showed in their attempts to visit the show this week in spite of the heavy snows which greatly handicapped transportation. The accomplishments of motor cars in the Northwest has produced an advertising inertia that is a material aid to the salesmen in their campaigns, since the need of cars is recognized by the people now as never before, and furthermore they have the money with which to buy cars.

With the fact established that the farmer just now is the most likely prospective car buyer, dealers and distributors have planned a very active campaign to begin in the early spring. The latest motor car census goes to show that in this particular territory there are at least 216,936 farmers who have not yet become car owners. Verily, the harvest is ripe and conservative estimates made by branch managers and dealers put the number of cars to be sold in this territory in 1917 at 90,000, which is an increase of 10,000 over the number sold last year. The average cost of these 90,000 cars is variously estimated at from \$765 to \$900 each. The first figure would give the valuation of \$70,000,000 in business for the year while a more liberal estimate would give \$84,000,000. When one is in Minneapolis making a survey of business conditions, one must think in terms of the soil. Here money and crops are synonymous. Bankers as a unit say that the territory is in a prosperous condition and although the crop as a whole did not come up to the figures for the bumper harvest of 1915, the average price is higher, which nearly made up the difference. Money is easy and collections are good.

Heavy Snows Foretells Harvest

Looking to the future—specifically 1917 crops—it must be said that the heavy snows in January and February presage the harvest that will be second to none in the Great Northwest since the motor car became a reality. As has been said before,

not in forty years has there been such a snow in January close to the Twin Cities, and if this blanket disappears gradually in the spring, the great snow overcoat of the Northwest will filter into the soil creating a deep moisture and causing grain to stool deep as preparedness against possible dry weather before harvest time. Present conditions are not materially unlike the moisture conditions of the growing season previous to the last big crop, yet the snows are heavier this year than in previous years.

Registration May Reach 200,000

Before making an analysis of what the 1916 crop or the one to come may mean in the sale of cars, perhaps we can get a better conception of their meaning by considering what crops have already done in the way of increasing cars in the state of Minnesota. It was estimated by J. A. Schmael, secretary of state, that by the end of 1917 motor car registrations in Minnesota will be 200,000 at least. To-day his books show slightly over 138,000 cars in the state, a figure which he prophesied a year ago. Half a decade ago there were only 17,960 cars in Minnesota. Two years ago there was but 68,500 machines, this number being increased 46,000 last year. Last year the secretary's estimate of the number of cars that would be running in Minnesota to-day was almost exact and if his estimate of 62,000 additional cars to be sold in Minnesota in 1917 is even 75 per cent as close as the estimate made last year, the figures given by dealers and distributors on the number of cars they expect to sell throughout the territory this year—90,000—seems conservative.

As usual, Ford leads in the number of cars now owned in this territory while Overland is second and still ahead of its nearest competitor, Buick. These two have run a neck-and-neck race a number of years, although the figures for 1916 as compared with 1915 for these two cars shows the Overland to have gained the most ground.

License Tags Last Three Years

License tags in Minnesota are sold for three years for \$1.50. The last triennium began in 1915. For the first two years the returns to the state were \$241,000 as compared with \$144,531 for the entire preceding three-year period. Beginning next year, license tags will cost \$5 for three years. This will be pro-rated after Jan. 1, 1919, at \$3.50, and \$2 for 1920. In the first period of three years 66,000 licenses were sold.

In 1915 licenses numbered 99,000 and in 1916 46,000 were issued. The rate of gain in the state is indicated in round numbers as follows:

1909	7,000
1910	12,500
1911	19,000
1912	28,400
1913	45,800
1914	68,500
1915	94,000
1916	138,000
1917 (estimated)	200,000

Analyzing the 138,000 cars now owned in Minnesota, we find 50,907 are owned in

towns of not more than 1000 population. In fact, this is a greater number than is owned in towns of any other population. The percentage of increase of the number of cars now owned in towns of under 1000 population compared with a year ago is 38.8. These figures indicate that the majority, in fact, nearly all of the cars, go direct to farmers. The relative number of cars owned in small towns and in the three large cities—Minneapolis, St. Paul and Duluth—serves to prove the farmer's case even further. Registration figures of cars owned in these three cities total 30,096, in 1916, which, subtracted from the total registration of 138,000 gives 108,000 owned by farmers and people in towns outside of these three large cities. Outside of these three cities, there are no others in the state in excess of 20,000 population, and in the towns with populations ranging from 10,000 to 20,000 only 3,277 cars were owned last year. In the class of 9,000 to 10,000, the number of cars last year totaled 1,154, while those in towns from 2,000 to 9,000 totaled approximately 15,000 cars. This would leave approximately 90,000 cars owned in towns under 2,000 and in the country districts.

Buying Faster Than Growth

The Northwest is buying cars faster in ratio to its population than any other district in the country and it is not unusual to find people close in touch with the industry saying that within the next ten years there will be a car for every 10 or 12 people throughout the territory. It must not be thought that Minnesota farmers, or in fact farmers of the entire territory that gets its cars from Minneapolis, are near the saturation point in car buying. While it is admitted that approximately 50 per cent of the farmers in Minnesota, the Dakotas, eastern Montana, northern Iowa and western Wisconsin—the territory embraced in the Minneapolis district—own cars, the other 50 per cent will be buying cars within a comparatively short time and to-day there is a definite field for the sale of approximately 216,000 new cars in this district to say nothing of the re-orders from present car owners.

Increases in Certain Makes

Analyzing how certain makes of cars have increased in Minnesota during the last year may serve as a better indication of what may be expected this year and next. Ford registrations increased 13,763, Overland added 4224 machines and Buick 2030 last year. Studebaker added 2800 more registrations in 1916 than in 1915, Maxwell 1443 more and Dodge 998 more, the latter practically doubling the number registered the previous year. Following are some of the makes that lead in registrations in the state:

Ford	44,471	Reo	8,101
Overland	11,802	Saxon	1,078
Buick	8,716	Jackson	579
Studebaker	7,437	Jeffery	574
Cadillac	1,924	Kissel	573
Chalmers	1,122	Krit	632
Chevrolet	2,440	Imperial	634
Dodge	1,946	Metz	654
Hudson	1,219	Obisnoide	654

Hupmobile	1,212	Packard	817
Maxwell	4,974	Paige	816
Mitchell	1,284	Eagle	950
Oakland	1,555	Velle	778

The foregoing figures tend to show that farmers are buying cars selling for more than \$1,000 and information gained from dealers and distributors in general at the Minneapolis show was to the effect that the farmers in the Northwest show a greater tendency from year to year to buy cars of the more expensive type, especially those listing above \$1,000.

Position as Distributor Deserved

The Twin Cities made good in the position they took last year, that of being the biggest distributing territory in the country for many makers of cars. More than ever are manufacturers realizing the importance of this territory. Carload receipts of motor vehicles into Minneapolis last year showed a gain of 25 per cent over 1915, the figures for the two years being 5804 and 4835 respectively, while shipments of complete cars showed an even greater gain, the number of carloads shipped out of Minneapolis in 1916 being 6930 as against 3337 in 1915.

As an indication of what some makers think of this territory as a field of endeavor, the production program of the Ford Motor Company's assembly plant is indicative. During the last fiscal year for the Ford branch, which ended July 31, 1916, 25,954 cars were assembled and sold while the number built since August 1, 1916, totals almost as much as all that were produced during the previous fiscal year, the actual number to date being 22,232, while the production program for this year calls for between 50,000 and 60,000 cars. Just at present the plant has been idle from two to four days every week, the scarcity of freight cars being largely responsible for this condition. Freight cars are and have been at a premium in the Twin Cities for several months and the situation is more acute just at present than it has been previously. Officials of the traffic bureau estimate that Minneapolis industries in general are not getting more than 10 per cent of their requirements.

1760 Carloads of Ford Parts

The Ford branch received 1760 carloads of parts during the fiscal year ending July 31, 1916, and since that time received 1200 carloads. Outgoing shipments during the last fiscal year were 2981 carloads and since Aug. 1, 1916, 2353 carloads have been shipped. No cars are stored in Minneapolis at the Ford company and production at present is kept in harmony with the number of freight cars available.

As an evidence of how car shortage affects industry in Minneapolis the Washburn-Crosby Co. during the last few weeks has averaged 7700 barrels of flour a day in its plant whereas its capacity is 28,000 barrels daily. This is the average situation. Few if any of the manufacturing concerns are running over one-third their capacity. Flour to-day in carload lots is selling for \$8.40 a barrel, whereas a year

ago it was \$6.35. The highest mark reached in the last few weeks is \$9.65 a barrel. So urgent has become the demand for freight cars that the Minneapolis traffic association has sent a committee to make a plea before the Interstate Commerce Commission for the release at the earliest possible moment of all cars being held in the east. Over 25,000,000 bushels of wheat and millions of bushels of oats, barley, corn and rye are tied up in elevators in Minneapolis. Millions of bushels more lie in cars in the railroad terminals and on sidings in the territory surrounding Minneapolis.

Grain and Car Situation Similar

What is true of the grain situation is true in a measure with motor cars. Of course at present the call for cars for retail sales is not heavy, but the car factories are anxious to move as many machines to points of distribution as possible to avoid storing them at the factory and several manufacturers are now shipping cars from Minneapolis and storing them as rapidly as they can get freight cars to handle shipments.

One big branch manager in Minneapolis who has sold his entire allotment took occasion to classify Montana as one of the best present sales districts in the Northwest, which, according to him, is doubly as good as a year ago. North and South Dakota are not considered as good as in previous years and the same might be said in Minnesota, yet in these three states there is a golden opportunity for aggressive car salesmen. Montana people have had greater incomes in 1916 than at any time in the last ten or fifteen years and it is here that more of the big, high-priced cars are being sold than elsewhere in Northwest. There is more difficulty in getting cars for delivery than in selling them.

Car Delivery Shortage Serious

It is this condition of shortage that led Frederick E. Murphy, secretary of the Automobile Trade Association, to say that the importance of the present show is to key dealers and agents up to the situation that confronts them. Further, he declared the situation serious enough to require the presence in Minneapolis of every man engaged in the motor car business in the Northwest.

Looking again at the financial situation, banking conditions of the Twin Cities center reflect the situation throughout the ninth regional reserve bank territory. Bank clearings in Minneapolis for 1916 were \$1,469,874,000 and for the Twins, that is Minneapolis and St. Paul, a total of \$2,254,565,100 as against \$2,300,460,332 the year previous. Bank transactions in Minneapolis for 1916 were \$5,440,770,000. On this basis the St. Paul estimate, no record being kept, will be \$2,900,000,000, a total for the Twin Cities of \$8,340,000,000.

Another straw that shows the direction of the financial wind is found in the business of the Federal Reserve Bank which

showed gross earnings in this territory during its second year of \$238,000 and total resources of \$37,187,000 compared with \$99,600 and \$16,486,000 in 1915. Crop moving demands, according to the Federal Reserve bank report, required a total of \$8,500,000, which was promptly put into circulation for handling grain. While the crop is far short of the 1915 crop, the unusually high prices required a total issue for this purpose which was \$500,000 in excess of the amount required to move the previous crop. The Northwestern National Bank reports the tone to all business as decidedly cheerful and that high prices have undoubtedly had influence on total sales. Bank deposits and interest rates show a seasonal slight decline while the January sales as reported by Minneapolis wholesale and retail establishments are in general ahead of last year.

Million and Half for Buildings

With the knowledge gained from the statistics given it is easy to see why motor car dealers, as a class, are expecting a tremendous year in sales and why this year's show has been so materially enlarged compared with its predecessors.

It may be taken as a criterion of increased business that more than \$1,500,000 has been spent in new motor car buildings in Minneapolis in the last year. This includes the \$500,000 Overland distributing plant and the proposed Maxwell plant now building which will cost \$300,000. Overland has a new retail plant in Minneapolis costing \$150,000. To these figures might be added the new plant of the Twin City Four-Wheel Drive Co., near the Overland distributing building, costing about \$250,000. In branch and retail buildings about \$460,000 has been spent since the 1915 show.

Several new car and truck agencies as well as tire distributors have entered the field. Kelly-Springfield enlarged its agency to a branch and the Chalmers now has a branch in Minneapolis. Among the others who have opened branches in the last year are the Stewart-Warner Speedometer Corp., the Imperial Auto Supply Co., the Times Square Automobile Co., the Ahlberg Bearing Co. and Bearing Service Co. A \$5,000,000 company was formed to make the Ware truck in Minneapolis, the company being styled the Four-Wheel Drive Mfg. Co. It bought the W. S. Nott motor fire engine factory. The Twin City Four-Wheel Drive Co. practically doubled the size of its St. Paul plant which it opened about a year ago. Fully twenty-five new concerns were formed for selling cars and accessories in the last year besides those mentioned.

Tractor Business Has Grown

The agricultural tractor business which may be said to have been in its infancy in the Northwest a year ago has shown phenomenal growth. Minneapolis and St. Paul are now acknowledged as the home of the agricultural tractor industry and whereas a year ago a few tractors were demon-



Indianapolis Holds Its Best Show

Current Exhibition Opens Under Best Physical Conditions in History of City

INDIANAPOLIS, Ind., Feb. 10—The best show Indianapolis, Ind., has had in the last sixteen years closes here to-day. It is a composite exhibition, for it contains forty-five pleasure cars, forty-four accessories, eighteen trucks and two tractor exhibits. In these exhibits are forty-one closed cars, seventy-five touring cars, forty-nine roadsters, twenty-seven trucks, twenty chassis, four electrics and two tractors. The scarcity of closed cars on exhibition may be explained partly by the advance of the season. It is about time for the spring campaign on touring cars.

Warm Building for First Time

Physical conditions are more favorable for the show this year than ever before. The exhibition is not being held in a poorly heated building where the visitors must shiver no matter how interested they are. The new home of the Dodge and Cadillac was turned over to the Indianapolis Automobile Association for the show this year, and it was not necessary to use the State Fair Coliseum, which is large but poorly heated. Lack of heat has marred previous shows, but this year the show building is steam heated.

The trucks are on the ground floor; the accessories on the second. Pleasure cars occupy both third and fourth floors. Each exhibit has about 10 ft. of space, and the booths are uniform in appearance. The accessory exhibitors are mostly local dealers and jobbers.

Though the decorations are simple, they cover the concrete walls adequately and set off the cars. Foliage covers the walls, posts and beams, while palms, ferns and small fountains are used in the corners. Each exhibit is marked clearly away from its neighbors by a white hurdle, and the signs are in black and white.

How Exhibits Ranked

Cadillacs and Dodge had the best exhibits, but they had the advantage of their own show rooms on the ground floor. Marmon and Hudson were next. Marmon had a willow work table and chairs, reading lamp and a few rugs. The Hudson exhibit was treated in a similar manner but was not as noticeable as it was in the central aisle.

Of the 6000 dealers Indianapolis claims as a center, 2500 are estimated to be present at the show. Many of them have come to Indianapolis to sign the contracts made at Chicago. The free ticket situation was well handled. Postcards sent to the sub-dealers in advance entitled each to

one season ticket. Presentation of these cards at the manager's office, together with identification of dealer, was required. Only one season ticket was given in the case of a partnership.

The show was well advertised, also. Where \$4,000 was spent on the decorations, \$3,000 was spent on advertising. Billboards, newspapers, posters and cards in stores and railroad stations were used. Banners were hung in the principal streets, and the moving picture house ran reels of previous shows. Everything was done to

PORTLAND SHOW LARGER

Portland, Ore., Feb. 9—When the curtain lifted on Portland's eighth annual motor car show at the Armory, 115 pleasure cars and thirty-five makes of trucks were on dress display in various booths, with the selling organizations of some forty Portland motor car firms in the receiving line.

The 1917 exhibit was fully 50 per cent larger than the show of 1916, though several dealers were delayed in receiving shipments by the car shortage. The main room of the armory contained pleasure cars selling for more than \$1,000. Cars selling for less than \$1,000 were on the second floor, and a special annex was built for trucks.

Railroads Gave Rates

The show was under the auspices of the Dealers' Motor Car Association. Special rates were granted by railroad and transportation companies, and many Oregon and Washington dealers attended. Among those in attendance were James Robertson and W. M. Buck of the Dort factory; E. M. Cox, Seattle, Northwest distributor for Grant cars; W. S. Dulmage, Chevrolet dealer in Seattle and Tacoma; M. L. Gallagher of Spokane; "Dad" Allen of the Allen General Tire Co., Seattle; Francis Ford, Pacific Truck & Trailer Co., Seattle; Duncan A. Hamilton, secretary of the Automobile Association of British Columbia; Charles A. Harris, Victoria, secretary of the Inland Automobile Association.

Two Factors in Success

Two factors have contributed greatly to the success of the motor car business at Portland during the last year; the great increase in the shipbuilding industry, there now being sixteen shipbuilding companies in Oregon with contracts for the construction of vessels totaling more than \$25,000,000, and the high prices obtained for wheat, thousands of dollars from this source having already found its way into the pockets of the dealers.

advertise the fact that the show would be held in a warm building.

One feature of the show, however, was very bad. Everybody smoked. This started the first day while the exhibits were being arranged and enforcement of the no-smoking rule was lax. When the show opened nobody stopped. The visitors took it up, and finally everyone but the women was smoking.

May Have Show Building

Indianapolis may have its own show building next year. This building will not be available. The association is considering the purchase of land and the erection of a coliseum. John B. Orman, who has directed the Indianapolis show for the last ten years, is manager this year also.

INDIANA AS A MANUFACTURER

Indianapolis, Feb. 10—Indiana claims to be the pioneer state in the manufacture of motor cars. Ten makers are in Indianapolis: Cole, National, Pathfinder, Premier, Stutz, Marmon, Empire, Colonial, Hassler and a Ford assembly branch. Thirteen other makers are in the state. These Indianapolis makers produced 24,762 cars in 1916, and it is estimated that they will produce 60,000 during this year.

The railroad car shortage has not caused much trouble in Indianapolis. It is practical to drive out from the Indiana factory. Buick and Overland can reach Flint and Toledo readily, and it is noticeable that the car shortage problem has not been a large problem to Indianapolis car manufacturers.

Because it has excellent shipping and manufacturing facilities Indianapolis is a jobbing city. Many nationally known accessory and parts manufacturers are here, such as the Prest-O-Lite Co.; the Parry Mfg. Co.; the Wheeler-Schebler Co.; the Hassler Motor Co.; Wiedley Motors; the Butler Mfg. Co.

Good Roads in Indiana

Indiana has good roads, too. Of course, business gets lighter in the winter, but Indianapolis and the state has nothing like the problems Chicago and Illinois has with the mud roads. A good roads bill now in the Indiana senate proposes to turn over the net proceeds from motor car licenses to the fund for road construction. This amount is estimated to be from \$700,000 to \$1,000,000 and may be used to build up to 2000 miles of roads each year until 1920. The passage of the bill is not certain, as it has been opposed by some of the counties.

Mathematics of the 19th Century



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Pulling Illinois Out of Mud

Malcolm MacKinnon, Father of Three Highway Movements in State—His Work Reflects Much Credit

By E. E. Pierson

IN THE campaign to "pull Illinois out of the mud," many public-spirited men have become aligned, but, doubtless, no one will dispute that the individual who has accomplished the greatest amount of progress and put over the most extensive system of highway improvement by reason of tireless energy, personal magnetism, and convincing appeal, is Malcolm MacKinnon, Rockford, Ill. He is entitled to credit for originating the Meridian highway, the Grant highway, the Blackhawk trail and the Lake-to-River road—all popular with motor tourists, and all covering important stretches of territory in the middle west.

Largely Responsible for Work

Not only did he suggest the improvement of these now famous routes, but he was largely responsible for their development and in arousing the interest and enthusiasm of the citizens, commercial clubs, and municipalities along the right-of-way. The work has been incalculable in extent and far reaching in importance. Its value will become more pronounced and better appreciated as the years pass. Posterity will extend a laurel wreath to the man to whom credit is due, even if the present generation may appear indifferent.

Mr. MacKinnon has been animated by his work in behalf of good roads, solely by public spiritedness and his realization of the importance of improvement in the highways of the middle west. Fourteen years of newspaper work, may have stimulated this viewpoint. Commencing as a cub reporter upon the Chicago Herald, he later went to Oklahoma when that territory was in the pioneer stage, and rose to managing editor of the Oklahoman when but 23 years of age. Later, he was connected with the Times of Davenport, Iowa; Journal of Moline, Ill.; Tribune of Sioux City, Iowa; and News of Cleveland, Ohio. He was editorial writer for the latter two publications. In Cleveland, he attracted attention as a political writer and conducted several publicity bureaus during the hot campaigns in which Tom L. Johnson was conspicuous. Mr. MacKinnon also was associated with Gov. Albert B. Cummings of Iowa, in his campaign.

Experience Has Been Varied

Leaving the newspaper field, Mr. MacKinnon became advertising manager for the Bell Telephone Co., in the states of

Iowa and Nebraska. He holds a commission as first lieutenant in the Illinois National guard, being appointed by Gov. Deenen as member of the staff of Gen. Kittleson. He served with the sixth regiment in Porto Rico during the Spanish-American war.

Improved Roads Interest Him Deeply

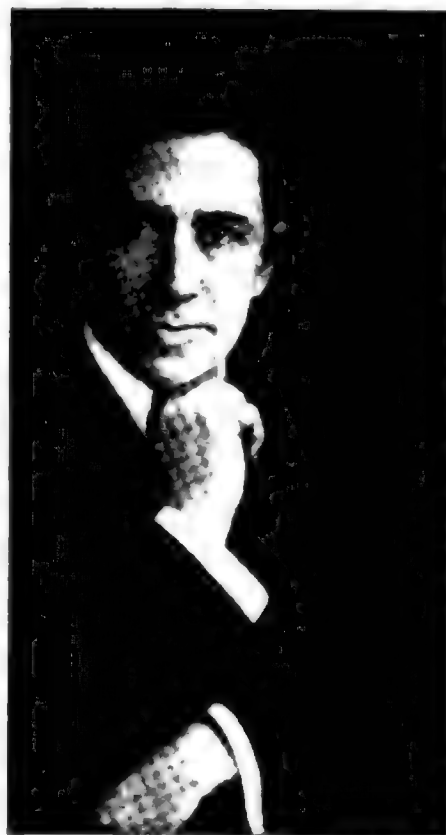
For the last five years, Mr. MacKinnon has been interested deeply in the problem of improved roads and how to bring about better conditions along the great highways of the middle west. He believes that this field offers a wider range of usefulness to the public than any other, and one in which there has been tremendous increase in public attention, due to the wonderful output of motor cars. Mr. MacKinnon finds that residence in Rockford, Ill., promotes convenience, as it is at the intersection of the Meridian and Grant highways and near Madison, Wis., where he maintains headquarters in connection with the Board of Commerce. He is also allied with the Rockford Chamber of Commerce, both having aided him materially. Other organizations that co-operate heartily include the Bloomington Commercial Club, the Decatur Chamber of Commerce, the Centralia Commercial club, the Cairo Association, and the La Salle and Mendota Commercial Clubs, all of Illinois.

Co-Operates with Organizations

Outside of Illinois, he finds co-operation of the Merchants and Manufacturers Association of Milwaukee; the St. Paul Association of Commerce; and the Dubuque, Iowa, Automobile Club. In Grant highway work, he has been associated with the Good Roads Club of Cook County.

There are trails and trails. Some of them have much more logic behind them than others. Mr. MacKinnon holds that the four which he has been promoting are of the logical kind and the fact that he is at work twelve months out of the year in behalf of their improvement accounts for much of their success and their popularity with the motoring public. All four stand out prominently among the good roads movements of the Middle West.

The Meridian highway, the route that nature laid out as the short line from the Gulf of Mexico to Lake Superior, from the delights of Dixie to the pleasures of the lakes, hills, and woods of summertime Wisconsin, is one of the most noteworthy of



Malcolm MacKinnon, originator of three Illinois highways

the quartet which have been given their place in the good roads hall of fame. In Illinois, this road runs from the Wisconsin state line, to Cairo, almost without a deviation as the crow flies, and is the shortest route between two points as far apart as Beloit Wis., and Cairo, Ill., as exists in the United States. Besides, it traverses the richest agricultural section of the nation and passes through about seventy cities and towns in Illinois.

An Old One

The Grant highway, from Dubuque to Chicago, over the old Galena trail on which the pioneers of the Galena district freighted ore and merchandise to and from Fort Dearborn in the days before there was a Chicago, is another popular route, which has been brought to a first-class condition and given the indorsement of thousands of motorists largely through the efforts of Mr. MacKinnon. This is likely to be one of the first cross-state roads of Illinois to be paved with concrete over its entire length.

The Black Hawk trail, extending from Sterling, Ill., to Milwaukee, Wis., is another for which Mr. MacKinnon has been sponsor. This route follows the Rock river in Illinois, going through a region of wondrous beauty and famed the country over for its picturesqueness. Destined to become world famous as a drive, it reaches scenery which is not surpassed for greater charm, in the opinion of those in a position to judge.

Last, but not least, the Lake-to-River road, in Wisconsin, extending from Mil-

waukeec, Wis., to Dubuque, Iowa, via Madison, with a branch from Dodgeville to Prairie du Chien, has also been fathered by Mr. MacKinnon. This was the first marked road in Wisconsin, and it became one of the most popular roads among tourists.

That the standing of the organizations formed by Mr. MacKinnon to promote the improvement of the three highways in Illinois is high is demonstrated from the fact that George D. Roper, president of one of the leading industries of Rockford, is president of the Grant Highway Association. W. P. Graham, of Rochelle, father of the Lincoln highway in Illinois, is president of the Meridian highway, while Gov. Frank O. Lowden heads the Black Hawk Association.

His Methods Proved Good

The methods employed by Mr. MacKinnon, of constant agitation along sane lines, free from those features that have stamped some other trail marking movements as local in their conception and mercenary in their motives, have brought about more improvements in roads in northern Illinois in one year than had been accomplished in fifteen years previously. There has been much improvement along the Meridian highway, which follows closely the third principal meridian. There is much concrete construction along the Grant highway and some on the Black Hawk. Most of the counties through which these trails pass are considering bond issues for improvement of all of the state aid roads. The Grant highway will probably be extended across Iowa on the line of the Hawkeye highway in 1917, it is said.

To Lecture Along Meridian

Mr. MacKinnon is preparing for a lecturing tour along the Meridian highway during the present winter and spring, to enlighten the public concerning the progress made and the plans for the future. This is in accord with similar trips he has made in promoting the other highways, taken in hand before the Meridian was launched.

It has not always been clear sailing in the campaign for good roads. There have been periods of discouragements when it has appeared impossible to arouse the public to the importance of improving the highways. This is a situation which has been experienced by all pioneers in such movements. Mr. MacKinnon, however, has been superior to such handicaps. His indomitable courage and boundless energy, have been factors that produced success and achieved permanent results. The future historian of the good roads movement in Illinois, Wisconsin and Iowa will accord Malcolm MacKinnon prominent mention. As a trail blazer, his name will, no doubt, be among the foremost of the Middle West good roads promoters. Meanwhile he will continue his good roads work for pulling Illinois out of the mud.

Thousands Disregard Road Warnings

Though Advised Against It More Than 25,000 Motorists Followed Dixie Highway This Season

APPROXIMATELY 27,000 tourists traveling in 6900 cars followed the Dixie highway this season in spite of warnings sent out by the association, touring bureaus and clubs. This estimate is based on reports made to the association by ferry owners on the eastern and central divisions of the highway. The keeper at St. Mary's river between Macon, Ga., and Jacksonville, Fla., reports 2500 cars passed south. The Woodbine ferry, between Savannah, Ga., and Jacksonville, reported 2400.

The number of cars entering Florida over the National highway and the western division of the Dixie highway is estimated at 2000, and of this 6900 cars 4400 are judged to have gone down the coast from New England.

Greater Travel to Come

If 2500 car owners will disregard the warnings of friends, touring bureaus and clubs that the highway is not open for winter travel this year, it is no more than reasonable to suppose that ten times this many will motor to Florida during the 1917 season, if the Dixie Highway Association can announce at least one division offers a fairly comfortable trip from Chicago or Detroit to Florida. And this the association expects to be able to do.

No small part of the difficulties travel on the Dixie highway now offers is due to the construction work which was begun and delayed in completion by the wet weather. Many counties in Tennessee, Northern Alabama and sections of Georgia have newly graded roads which they have not had time to surface and which are harder to travel than they were before they were improved.

Condition of Western Division

Only 20 miles on the western division between Louisville and Nashville remain to be surfaced out of the 208 total mileage. This stretch has permitted through travel this winter, as it has unsurfaced stretches of Telford base which is rough and can be traveled any kind of weather. Between Nashville and Chattanooga, where the worst part of the western division is, an entirely new road is being constructed.

Rivalry is hastening the building of the highway sections. That part between Nashville and Chattanooga must open its section if it is to get the motor travel from the North, which Chattanooga's attractions may bring. The road from Nashville to Huntsville is passable now, and the counties between Huntsville and Rome, Ga., are determined to have part of this travel. The state department of highways of Georgia has designated the highway from Rome

to the Alabama line as one of the roads to receive Federal aid. At the Alabama line it will join the road now under construction from Huntsville.

CROSSINGS REGULATION ARGUED

Los Angeles, Feb. 9—For more than a year litigation in which this city has been involved in the effort to regulate grade crossings has dragged through the courts. What is said to have been one of the most novel arguments ever advanced in this connection recently was presented to the State Supreme Court in the effort to determine whether the State Railroad Commission or the city has jurisdiction over grade crossings. The city attorney argues the Railroad Commission was not given power over municipalities and other governmental institutions but was only given such powers as were possessed by the railroad companies themselves.

Rights of Commission Argued

The city attorney says the companies had by statute the right to fix rates and had other rights; that they became inefficient in carrying out their operations and the Railroad Commission was established as a sort of overseer to keep them up to the mark. In other words, the city attorney contends the commission practically took the place of the directors of the railroads.

The railroad companies, the city attorney maintains, never had the right to say how they would cross the streets but the city always had that right.

DEFERS FENDER REQUIREMENT

Chicago, Feb. 9—Chief of Police Scheutler has agreed to defer enforcement of the ordinance requiring fenders on motor trucks, the Motor Truck Owners' Association announces. The agreement comes after a long fight on the part of the truck owners against the ordinance, which was passed in July with a period of 6 months in which to test out the various fenders which local concerns were making an effort to have indorsed by the police department.

TO STIMULATE TRAIL INTEREST

Louisville, Ky., Feb. 9—To stimulate interest in the building of those sections of the Midland trail passing through the three eastern Kentucky counties of Boyd, Carter and Rowan, a bi-state road meeting has been called for Feb. 22 at Ashland by ex-Governor W. A. MacCorkle, of West Virginia, Midland vice president for his State, and Dr. I. L. Elmore of Louisville, Kentucky, vice-president.



Output of a Motor

The output of a motor depends on the torque the motor is developing and the speed at which the motor is operating. If the torque be measured in pound-feet and the speed in revolutions per minute, then the output of the motor in horsepower may be determined by the following equation:

$$\text{Output in horsepower} = \frac{6.2832 \times \text{torque} \times \text{revolutions per minute}}{33,000}$$

It is evident from the above equation that the horsepower the motor is delivering will vary directly as the torque if the speed remains constant and directly as the speed if the torque remains constant.

Operation of the Shunt Motor

The connections of a shunt motor are shown diagrammatically in Fig. 185. In this particular case the motor is arranged to be operated from a three-cell storage battery. When the switch S is closed a current whose value will depend on the voltage of the battery and the resistance of the field circuit will be established in the field winding and at the same time a current will be established in the armature circuit. The current in the armature will react on the magnetic field produced by the field current, and a torque will be produced, which will cause the armature to rotate unless the load on the motor happens to require a greater driving torque than the motor is capable of producing. Assuming the torque the motor is producing is ample to start the load, then the speed will increase, which causes the counter-electromotive force to increase, it being zero in value while the armature is standing still, and as a result there will be a decrease in the current in the armature and hence a decrease in the torque developed.

The speed will continue to increase and the torque to decrease until the torque developed is just ample to drive the load at the particular speed it is then operating. Any change in load on the motor will mean a change in the torque the motor is required to develop, and hence a change in speed will take place and the current in the armature will adjust itself to the required value to produce the desired torque. With an increase in load there will be a decrease in speed, but this decrease, in the ordinary shunt motor, ordinarily will not amount to a great deal in percent of the motor's rated speed, as a very small decrease in speed will result in the necessary decrease in counter-electromotive force. As a rule the counter-electromotive force differs from the impressed voltage acting on the motor by a very small amount.

The relation between torque and armature current and speed and armature current may be represented graphically, as shown in Fig. 188. If the field strength of the motor were to remain constant the torque would increase directly as the armature current. Since there is a weakening of the magnetic field, due to armature reaction and other causes, the torque will not increase quite as rapidly as the current, and this increase will grow less and less rapid as the current increases in value, which accounts for the curve in the figure, marked torque, not being a straight line.

The speed of the shunt motor decreases with an increase in current in order that there be the proper reduction in counter-electromotive force so that the current may increase and thus produce a greater torque.

Operation of the Series Motor

The connections of a series motor are shown diagrammatically in Fig. 186. When the switch S is closed a current will be produced by the battery in the armature and field circuits in series. The value of this current, at the instant the circuit is closed, will be equal to the voltage of the battery divided by the total resistance of the circuit, and it will have its maximum possible value, since no counter pressure is generated in the armature of the motor when it is standing still. This large current will produce a very strong magnetic field, and hence a maximum torque will be developed. This torque will cause the armature to rotate, unless the torque required to drive the load exceeds that of the motor, and just as soon as the armature starts to rotate a counter-electromotive force will be generated, which will cause a decrease in armature current and hence a decrease in

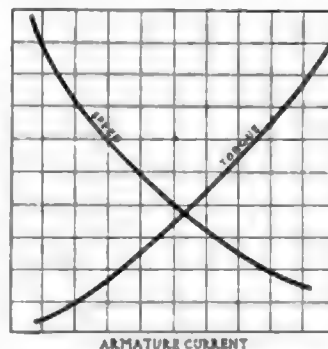


Fig. 187—Relation of torque and speed to armature current for a series motor is represented here

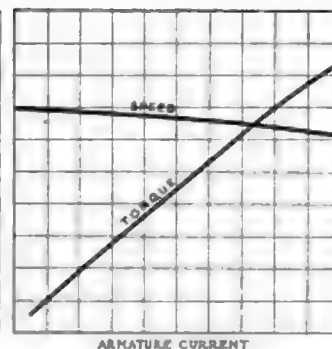


Fig. 188—These curves show relation of torque and speed to armature current for a shunt motor

torque. When the torque has decreased to a value just ample to drive the load at the speed at which it is then operating, the speed of the motor will become constant. As the motor speeds up there is a decrease in torque, due to a decrease in armature current and also due to a decrease in field strength. If the load on the motor is decreased, the torque the motor is developing is more than ample to drive the load, and it immediately starts to increase in speed. The increase in speed means an increase in counter-electromotive force and a decrease in armature and field current. The decreasing field current causes the field strength to grow less, which tends to lower the counter-electromotive force. This tendency of the decreasing field strength to lower the counter-electromotive force in effect does not amount to as much as the increase in speed, which results in the counter-electromotive force increasing. The increase, however, is not as much as would take place, due to a given change in speed, if the field strength remained unchanged. Hence, in order to bring about the required increase in counter-electromotive force with a decrease in load on the series motor there will be a greater increase in speed than in the case of the shunt motor.

Speed and Armature Relation

The relation between speed and armature current for a series motor is shown in Fig. 187. When the load is removed entirely from a series motor the only torque it is required to develop is that necessary to revolve the armature. This small torque means a small armature and field current is required. The small field current means a very weak field, and the speed will be high in order that the proper counter-electromotive force be generated by revolving the armature in the weak field. In some cases this speed may become dangerously high, and for this very reason it is not advisable to try to operate a series motor when it is disconnected from a load.

The torque of a series motor increases more rapidly as the current in the armature increases than it does in the shunt motor. The reason for this is due to the fact that the field strength is increasing at the same time the armature current is increasing. The relation between torque and current is shown by the curve marked torque in Fig. 187. The characteristics of the series motor as pointed out above are such that it is much better adapted to the requirements of a motor to be used in starting the gasoline engine than the shunt motor.

Starting Motors

When the armature of a motor is connected directly to the source of pressure a current whose value is equal to the pressure divided by the resistance of the circuit will be produced. In some cases this current is excessive, and in such cases it is necessary to connect a variable resistance in series with the armature. As soon as the armature starts to rotate a counter-electromotive force will be generated, which causes the current to decrease in value, and the resistance may be decreased in value and finally removed from the circuit. Such a device is called a starting box, but it is used little with motor car motors, as the motors usually are designed to carry the maximum current the battery will send through them when the armature is at a standstill.

From the Woman's Viewpoint

What Women Are Doing for Roads

IT WILL be the women who make the roads along which the motorist goes beautiful when all is said and done. For it is the women who are taking the lead in the planting of trees and shrubs and flowers along the different highways. This is true of the Dixie highway especially, for as fast as the construction work of some particular section is undertaken, so fast does some women's organization take on itself the burden of doing the woman's bit.

Best Thing They Could Do

Nothing could be more appropriate than that the women of the motoring public should take this on herself. She gets as much out the motoring as anybody else does, and good roads work is something every motorist should foster. Naturally, being a woman, she cannot get out and drive a span of mules to a drag or haul crushed stone and so on, but she can do as she is doing, beautify the roads which she and other motorists will follow in their cars.

Eighty women in Bibb county, Tennessee, belong to a Dixie highway auxiliary which has planted hundreds of trees, had embankments graded and roads widened and organized subsidiary organizations. Only 25 of the county's 550 miles of motoring road belong to the highway, and the auxiliary expects to consider all. The auxiliary held a toll day to find out how many persons used the roads of the county in one day.

The idea of beautifying the roads was introduced into Georgia by Mrs. Logan Pitts, Calhoun, chairman of the Dixie beautifying committee for Georgia. Farmers helped all along the roads, and flowers and trees suddenly appeared everywhere.

What They Offer in Florida

The Saint Lucie County Federation, an organization of Florida women, quite a while ago offered to raise and present, free of cost to the county, all the trees and ornamental shrubs needed for the Dixie highway in the county. Only three of the clubs represented in the federation are on the highway, but all have promised to help and are helping. Red, white and blue colors will be carried out in the planting, and for this reason the women are growing red hibiscus cuttings in their flower beds, for red hibiscus, Jacaranda trees and white oleanders have been selected to carry out the colors.

Ten miles of eucalyptus trees have been planted along the Dixie highway near Jacksonville, Fla. The women planned it, if they did not actually do it. The Flor-

ida Federation of Women's Clubs not only has received much praise for its efforts in behalf of good and beautiful roads, but its

Feminine Motor Notes

Mrs. J. P. Hatfield and their daughter accompanied Mr. Hatfield on the trip from Dallas to the Texas Panhandle, which was made last fall and cut in two the actual running time made 10 years ago over the same route by a two-cylinder Haynes.

Several women were members of the party of motorists which left Indianapolis Jan. 9 for Florida under the direction of the Scarborough Motor Guide Co. They were from Illinois, Indiana and Ohio.

Mrs. J. H. Basel keeps house on wheels. At least she can if she wants to keep house that way. For she and Mr. Basel have made a "cottage" that travels. The cooking gallery is at the right in front of the driver's seat. A lavatory is at the left. Cooking utensils and food are stored under the driver's seat and gasoline under everything. Back of the seat is a folding table, two camp chairs and a rocker. The room contains a combination writing desk and kitchen cabinet. Two air mattresses form the beds at night and make a davenport by day. The car has covered 1800 miles with its "cottage" passenger.

Miss Ruth Law, the woman who established a new record for continuous cross country flying, is not only an aviatrix but a motorist. She owns a Maxwell sport car and likes to let it out on a long stretch of country road.

G. I. L. in Detroit Saturday Night says that it occurred to him while he was at Detroit's show that the wife was spending too much time in front of one certain car. Maybe that was part of the salesman's business. You know they say most of the cars the family buys are bought by the women.

Three women are touring from New York to San Francisco. The hostess of the three is Mrs. A. C. Ropes of New York. Mrs. Ropes, it seems, owns five cars and suddenly decided that she would escape the cold by taking two of her friends on a tour to the Pacific.

Miss Leonora Rice is distributor for the new dual power car in Little Rock, Ark. This is the Woods Dual Power made by the Woods Motor Vehicle Co. of Chicago.

colors, green and gold, have been adopted for the Ingraham highway, which reaches 85 miles southward toward Miami. Palm trees and yellow flowering shrubs give the colors. Among those used are the Allamanda, Yellow Lantana, Yellow Elder, Yellow Jessamine and Bignonia Venusta.

The Willing Workers Club, Avenue City, Mo., raised \$776 to spend on the Jefferson highway of their section. Four large wheeler scrapers were obtained through their efforts and are to be used in cutting down hills on the route.

Civic Gateway in Georgia

Then take the case of the Thomasville, Ga., auxiliary, the members of whom have planned a civic gateway as an entrance to Dixie highway in their town. Could anything be more conducive of good roads than a gateway that would call forth all the pride of the road that approached it? The auxiliary also is planting trees and shrubs and flowers along the highway, and the day when Thomas county is a county of roses may not be so far distant after all.

Mrs. William Henry of Rome, Ga., expects the women of Floyd county to mark their part of the highway, and there is no doubt that they will. The Women's Club at Rome has a City Beautiful committee which is looking after it.

Judging from the many instances coming to notice, the woman's clubs all over the country are doing active work in this line. It used to be that the select women's club met at regular intervals to listen to and read papers nobody present cared a whoop about. To-day is different in this way as in others. The city, the county, the state and even the whole country is the ground in which the local woman's club works. Members of the women's club take the lead in planting the roads and in planning such days as Good Roads Day, Toll Day and Planting Day.

To Get Benefits Themselves

That they themselves will gather part of the fruit of their work at least is evident in the increasing number of women drivers, who do not have to wait on the convenience of a chauffeur or member of the family to take to the open road. The women have joined the good roads and motoring movements with all their hearts and planning. Wherever the drag goes they follow after with seeds and cuttings. Then, in the full maturity of their locality's surfaced roads they will motor over those hard paths between green trees and flowers of different hues. Is it any wonder that they take such an active part when such a future is certain?

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The Readers' Clearing House



Touring Cars and Touring Necessities

EDITOR'S NOTE—Below is given a copy of a letter recently sent to a prominent body building concern by a Motor Age reader in Warner, S. D. He voices a feeling that may be echoed by many other motorists. Motor Age would be glad to receive the opinions of others on this subject.

Gentlemen: The writer has been an ardent tourist for the past ten years and in that time has used seven different makes of cars, but thus far has not owned one which was an ideal vehicle for touring purposes. The so-called "touring car" of past and present is no more fit for what the name implies than is the average "closed" car. It has been my observation that one of the most important matters to a tourist, the number of whom is growing steadily year by year, is the proper carrying space for the baggage or luggage necessary for real touring. The comforts of the passengers, under ordinary conditions of traveling, have been looked after and solved in the most approved manner by most of the modern automobile builders, but the moment the car is fitted up for a tour of 1000 or more miles, it becomes necessary to fill the space intended for the occupants with suit cases, bags, etc., and the "comfort" of climbing over these every time one of the occupants wants to get in or out is not what some of the makers think it is, especially in rain and mud.

I have long been at loss to understand the theory upon which the makers of the automobiles are working, when they appear to make such desperate efforts to "conceal" extra tires, which are best carried where most accessible, and where they may be amply protected from both sun and rain, by a very simple and inexpensive cover, at the rear, whereas they appear to make no effort whatever to provide a carrying space for a suit case or a bag, in which one carries one's clothing, far more valuable and vulnerable to the effects of weather, especially rain. I find strapping such things as

trunks and bags to the running board most undesirable and unsatisfactory, aside from being ruinous to both the trunk, bag and its contents. Why not devote more time to this phase of the modern body work, rather than that of carrying spare tires and wheels?

It seems suitable compartments could be easily and cheaply built into most any touring car or runabout body, where a suit case or two could be stored, out of the way, and yet protected against rain, mud and dust, which are so ruinous to clothing. I am prompted to write this letter to your firm, for the reason that I notice in the magazines that I read that you have produced some of the most advanced and desirable bodies which have thus far been brought out, and while my suggestion may not be anything new to you, or worth much, it will at least indicate the wants of those who use the modern car in long-distance touring, and who are of very much the same mind on this subject. I have had the pleasure of meeting hundreds of tourists from all over the states, at points like the Yellowstone Park and in Colorado, with cars often costing \$3,000 and \$5,000, but with no better provision for carrying baggage than was on my \$750 car or my neighbor's \$350 Ford.

The coming touring body is one with provision for AMPLE and SAFE carrying space for bags and baggage where neither mud, rain nor dust will get to them and yet where the occupants of the car will not have to be inconvenienced by them all the time, by having them piled up under their feet, or cramped by them being in the space where the passengers are supposed to be. MOTOR AGE would be glad to know other opinions.

KEROSENE AS ANTI-FREEZE FLUID

Reader Finds It Inexpensive Method—
May Be Cause of Fires

Marinette, Wis.—Editor MOTOR AGE—In two recent issues of MOTOR AGE in the Reader's Clearing House Department I have observed that you advise inquirers against the use of kerosene oil in the radiators of their cars during cold weather to prevent freezing. The only reason that you give for such position is that it tends to rot the hose connections between the circulating system and the radiator.

I have a 1915 four-cylinder Buick 37, and last winter I used kerosene oil exclusively for two months during the coldest weather and I have used it thus far this winter with perfect success and satisfaction. It has not as yet rotted the hose connections, but I expect it will do so and am using it with the understanding that it will rot the same. But I find that it will cost me less than \$2 to replace the hose connections, whereas denatured alcohol costs \$1 per gallon and glycerine costs \$2.50 a quart.

This makes it so expensive to use alcohol and glycerine in the proportions necessary to prevent freezing in weather such as we have in this northern climate—which frequently drops to twenty degrees below zero—that it is well nigh prohibitive. I have not yet discovered any bad effect whatever from the use of clear kerosene. I use nothing else with it.

I would suggest, however, to anyone who wishes to use kerosene oil that it would be advisable to open the discharge cocks at the lowest point in the circulating system and drain out about a cupful any once a week, as there is some water in kerosene and the water naturally seeks the lowest level and might freeze and stall the pump. It did so with me on one occasion and I discovered the cause and avoid it by draining a little from the system occasionally.

Kerosene costs 8 cents a gallon and 3 1/4 gal. fill the circulating system in my car. Hence, with an expense of less than 30 cents I accomplish what would cost in alcohol and glycerine about \$4. Kerosene should not be used, of course when the temperature is above freezing, as it will heat too rapidly.

I have inquired of several other car owners who are using kerosene oil and they report that its use is satisfactory to them. I understand that kerosene cannot be used in Ford cars, as the high r.p.m. of the engine in that car overheats the oil. If there is any other detrimental effect than the rotting of the hose connections through the use of kerosene, I would be glad to know it.—E. C. Eastman.

MOTOR AGE is in receipt of newspaper accounts of two cases in which cars caught fire when kerosene was used in the radiator and in both cases the fires were attributed to the gases given off by the heated kerosene. Whether or not the kerosene really was to blame could not be determined from the accounts as published, but the possibility exists.

The overheating with its accompanying smell is a disadvantage on warm days of winter, as is also the destruction of the hose connections.

Ford Rectifier Wanted

West Palm Beach, Fla.—Editor MOTOR AGE—Is there any way that a Ford generator can be arranged to take care of a storage battery used for lighting ignition, and starting, if desired? If so, in what way may same be done?—A. C. Casner.

No. As the Ford generator produces alternating current and the storage battery requires direct current. This can be accomplished only by the use of a rectifier. MOTOR AGE knows of no rectifier now on the market for this purpose.

IN RE-STORING THE SPARE TIRES

Keep Them in Their Original Wrappings
When Feasible

Joliet, Ill.—Editor MOTOR AGE—Before the advance in tire prices I bought a set of tires which I do not expect to use until spring. How should these be stored to avoid deterioration?

Leave them in their original wrappings and keep in a dark, fairly cool place away from dampness.

2—I expect to use two of these as spare tires this summer. Is it best to drive them a short time before carrying them as spares, or should I start carrying them without driving? I have been advised it is best to drive them first, but I do not see why.—C. W. Webster.

It is better to leave them in their original wrappings. In any event, do not allow them to become cut.

Remodeling Buicks

Laredo, Tex.—Editor MOTOR AGE—I have a Buick B 55, seven-passenger, which I desire to make a cross between a speedster and a roadster. Where can I secure plans and specifications for same, with top and windshield built low?—R. H. Kilshy.

Ozona, Tex.—Editor MOTOR AGE—Kindly advise where I can get plans for remodeling a Buick No. 16 into a speedster. I particularly want plans of a snappy body.—Luther Joslin.

Write to the Kuempel Co., Dubuque, Ia.

Wants Special Overland Gearing

Good Pine, La.—Editor MOTOR AGE—I have a 1916 Overland six, Model 86, geared 4 to 1 in high. I wish to put in a gearing of 4 1/2 to 1. Give the name of a concern making such a gear. J. P. Gilles.

MOTOR AGE knows of none.

REMODELING MICHIGAN MODEL R

Transformation of Touring Car Into Speedster Body Outlined

Alton, Ill.—Editor MOTOR AGE—I have a 1914 model R Michigan touring car which has run 23,000 miles. The motor is in good condition and nearly as quiet and smooth as it ever was. I would like suggestions for changing it into a speedster, also a sketch. One reason for the change is that the gears are noisy, especially the third and reverse, and as our town and surrounding country is very hilly it is often necessary to drop to third or second. I figure that by reducing the weight I can do most of my running direct. Does MOTOR AGE think I can save enough weight to help out much in this respect?

I do not care for any windshield or top and would like the seat as low as possible. The gas tank at present is under the front seat and is fed by gravity. Does MOTOR AGE think it best to put vacuum feed and raise the carburetor; this would shorten the intake pipe which is very long and makes it hard to start in cold weather. The machine weighs 3600 lb. now; how much can I reduce it? Would it be well to take one or more leaves out of rear springs? There are seven, the longest being 2½ by 50 in. Would MOTOR AGE advise changing the tires to 34 by 4 in. instead of 35 by 4½ in.? Would it be practical to take out third gear and use that lever slot for second gear, which is plenty fast enough going up hill, but is hard to get into as they are now arranged?—E. J. Lockyer.

Fig. 1 illustrates the transformation. This would result in a reduction of several hundred pounds weight and probably would improve the hill-climbing ability. A vacuum system with shorter intake manifold should improve the carburetion. With the lighter rear end it may be possible to lighten the rear springs as suggested. Try it with present springs first. Tires 34 by 4 in. should carry it and would give better speed ratio.

HIS CAR HAS ROUGH SPEED POINT

Improper Balance of Engine a Possibility Eliminating Feed Tank

Hammond, Ind.—Editor MOTOR AGE—When I am driving the car in high, anywhere up to 40 m.p.h., my car jerks, and has a coarse, intermittent grinding noise. After I attain that speed it runs very smoothly. It runs all right in first and second.

This is a four-cylinder Teetor T-head motor, 4½ by 6, having a Schebler Model L carburetor, Elasmann high-tension magneto, Stewart vacuum system, multiple disk clutch running in oil, Warner Muncie three-speed transmission, Hess full-floating axle.

The motor is clean of carbon, the compression is very good, and even compression on all four cylinders. The carburetor adjustment does not have any effect on this. I have taken this carburetor off and put on a Rayfield, with the same results. I have the Schebler on now.

It acts the same running on the battery as it does on the magneto. Could it possibly be that the trouble is in the Stewart system? The float does not leak. Could the level of gas be too high, and cause this trouble? The transmission and differential gears are in good condition. The brakes do not drag, and the car moves very easy.—John Ludolph.

Unless you can localize more definitely the grinding noise mentioned, the exact cause cannot be determined from the information given. The effect mentioned might be caused from worn gearset differential or engine bearings, loose flywheel or an aggravated case of missing at high speeds. You can determine whether or not the vacuum tank is at fault by using a temporary gravity tank mounted on the dash or windshield.

The Overworked Horn

Shawnee, Okla.—Editor MOTOR AGE—Have been an interested reader of your journal for some time and much interested in the traffic rules. I am where I see hundreds of cars pass every day and can't help

but see how the different people drive cars.

I find that when a new driver gets a car the first thing they learn is to work the horn overtime and expect every one to get out of the way when they sound it. I got to thinking it over and thought I would try out a plan myself. I drive a great deal and have not sounded my horn once in over five months except when out on country roads.

If the chief of police would keep watch of the reckless drivers who expect every one to get out of the way when they sound the horn and take it away from them they would soon learn to look out for the people and soon become careful drivers.—H. O. Bailey.

Wisconsin Aviation Engine

Camp Point, Ill.—Editor MOTOR AGE—Please give official record of Buick 1917 four, Malibohm, 1917 Monroe touring car, Maxwell and Oakland six.

No official speed records.

2—Give short description of Wisconsin aviation motor.

Published in MOTOR AGE April 13, 1916.

3—For what has this motor been used?—Roland Upchurch.

In the Stutz racing cars.

CHARGING THE SHORTAGE BATTERY

Proportions of Acid and Water to Use and Proper Charging Rate

Shamrock, Okla.—Editor MOTOR AGE—What proportion of acid and water should be added to a storage battery which has been thoroughly flushed?

2—At what rate should a storage battery be charged?—R. Souter.

1—When new solution is required, the best way is to mix it outside and then pour it into the battery. Chemically pure sulphuric acid has a gravity around 1.84, and to get the required gravity, 1.300, before putting it into the cells, it has to be mixed with water. Measure out two parts of the acid to five of water, and mix them thoroughly in an earthenware or glass container which is proof against the action of the strong acid. Pour the acid into the water—not the water into the acid—and allow the solution to cool before pouring it into the battery.

2—The charging rate of a battery depends upon its size. The average 6-volt, 60-amp-hour starting battery should be charged initially at 10 amp. and this tapered off to bring it to about 3½ amp. at the finish. Lighting batteries and ignition batteries have other charging rates.

THREE SKETCHES TO SUGGEST SPEEDSTER BODIES

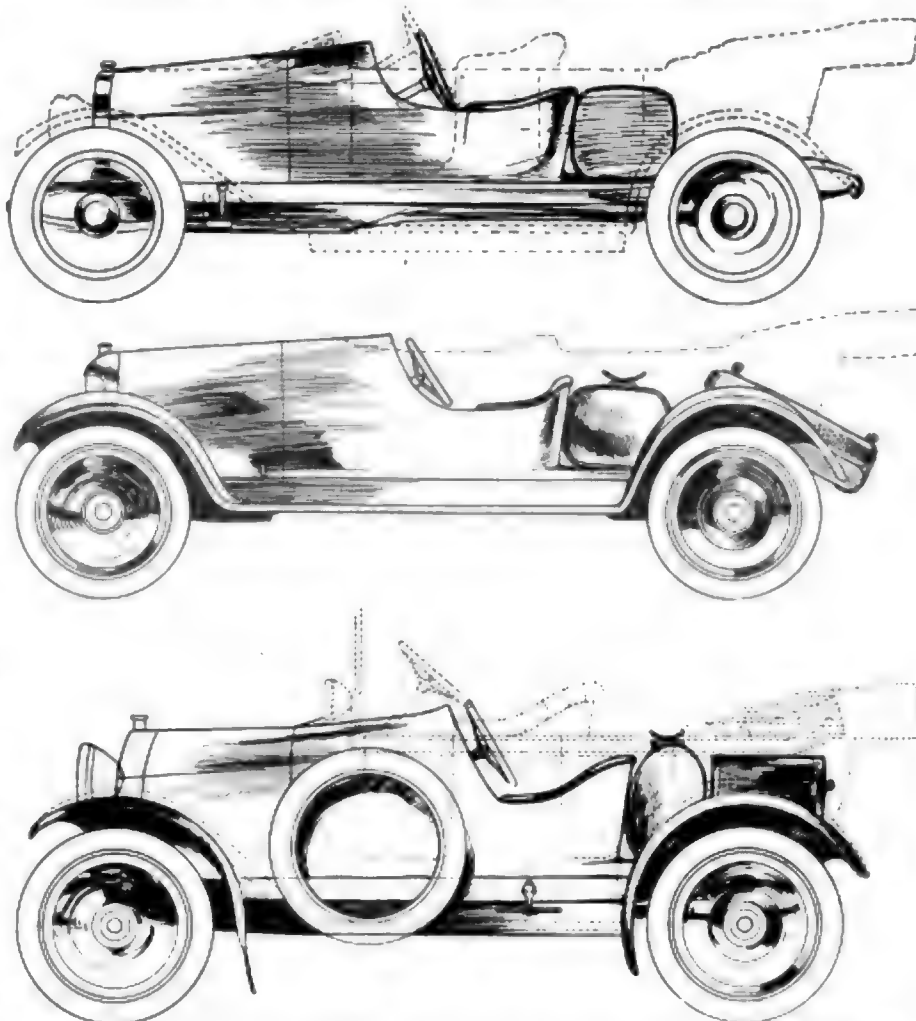
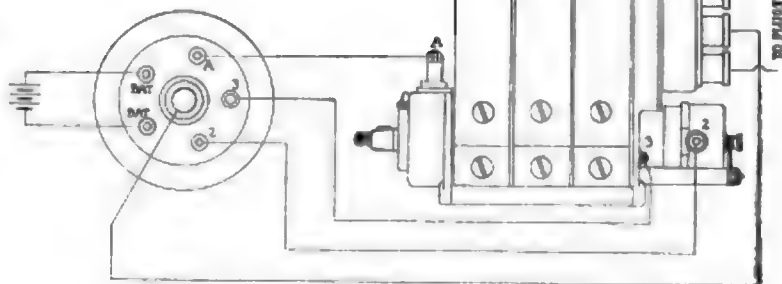
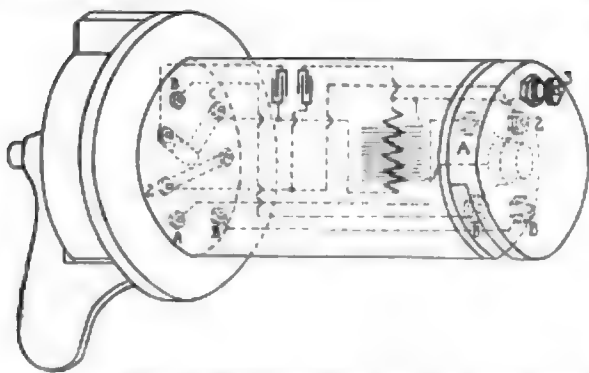


Fig. 1—Above—Remodeled Michigan model R touring car. Center—An Oakland eight stripped for speedster. Below—Design for Detroit speedster body





Figs. 4 and 5—Connections from the seven points on the switch to a T. R. coil used with a model Z Splitdorf magnet

tons. These are trade names of manufacturers.

9—The six uses a Continental. We stand corrected. The four uses an Overland-made motor.

10—Chevrolet and Buick.

11—They have. Practically all present-day engines have some provision for crankshaft counterbalancing.

WIRING DOUBLE-FILAMENT BULBS Two-Way Switch in One Method of Wiring as Illustrated

Findlay, O.—Editor Motor Age—I have seen the Hilo headlight bulb described in supply house catalogs as follows: "Has two filaments, one high, the other low. The high filament is in the focal point, the low filament back of the focal point. With the proper wiring either filament can be lighted from the seat, giving a dim or bright light as desired. Supplied with two-point Edison (double contact bayonet) base only, for 6-8-volt system. Low light is 4 C.P.; high, 15 C.P." Kindly explain and show a diagram of the wiring for this lamp.

2—Are special sockets necessary?

3—Can this wiring be used on a two-wire lighting system?—W. A. Stephenson.

Illustrated in Fig. 6 is one method. It only applies to a one-wire or grounded system, but two-wire sockets are used. One side of each filament is grounded to the lamp base and one wire (a) from the switch leads to the low filament while the other (b) leads to the high filament. With the switch turned to (a) the current flows through wire (a), thence through low-resistance filament and thence to ground through the lamp base and through ground to battery. This is not used in two-wire systems.

Design for Detroit Body

Bay City, Mich.—Editor Motor Age—I am going to rebuild a model B 5 Detroit, and would like suggestions for this work. If possible give illustrations so a trunk and tank can be carried on rear of car.—R. G. Karpus.

In Fig. 1 is shown a sketch of a model B 5 Detroit rebuilt with trunk and tank on the rear as you suggest. This rebuilding job would not necessarily be an expensive

one. It would necessitate discarding the present body and substituting in its place a pair of speedster seats, the trunk and tank as shown, and body work built up from the seats to the cowl. The same pedals can be used as well as the steering wheel which would, of course, have to be tilted.

FORD ENGINE NOT HIGH SPEED Planetary Gearset Not a Patented Feature —One Had Following

Mahaska, Kan.—Editor Motor Age—A garageman in this city claims the Ford to have the highest speed engine made. Is this true?

2—What is the engine speed at 30 m.p.h.?

3—Why do not other cars install the planetary clutch the same as the Ford, or is it patented?

1—The Ford engine could hardly be considered of the high-speed type. One might correctly call it a medium high-speed engine. There are a great many engines being put in present-day motor cars that are capable of 1000 and even 2000 r.p.m. faster than the Ford engine.

2—With stock gearing the speed of the Ford engine at 30 m.p.h. is 1230 r.p.m.

3—There is no patent on the planetary system of power transmission. In previous years it has been used to a greater or less extent by car makers, but the sliding-gear type seems to have become preferred in the new models.

Connections of Splitdorf Coil

Athens, O.—Editor Motor Age—Kindly give a diagram of the connections from the seven points on the switch to the primary coil, condenser and binding posts on a T. S. coil for a Model Z Splitdorf magnet.

Ans.—See Figs. 4 and 5.

2—Does this produce a spark on the make or break of the breaker points?—R. R. Downs.

Ans.—On the break.

Data on Blitzen Benz

Seattle, Wash.—Editor Motor Age—What is the bore and stroke of the Benz racer?

2—How many of these racers are there in this country?

3—What is the gear ratio of this car?

4—What is the wheelbase and size of the wheels?—Robert Masumok.

1—Blitzen Benz has a bore and stroke of 7.2935 by 7.8741; four cylinders.

2—One.

3—One to 1, about.

4—Wheelbase, 108 in.; tires, 32 by 4 front and 34 by 5 rear.

REBUILDING AN OAKLAND EIGHT Speedy Lines Gained By Very Low Seat and Mercer Lines

Topeka, Kan.—Editor Motor Age—Give an illustration of an Oakland 8, 1916 model, rebuilt into a speedster. I want to use the same hood, fenders and chassis. I would like to have the steering wheel lowered as much as possible, and extending back from the hood on a straight line with it, a cowl, this to extend nearly to the wheel. I want everything as low as possible without changing the frame. The back of the seat should be lower than the cowl and the body to extend back to the top of the tank, built close to the rear of the seat, similar to the Mercer raceabout. A few inches behind this a smaller tank, and then the spare tire.

2—Would a lower gear ratio on the rear axle be advisable, and what ratio?

3—What changes in the engine would give more speed, and just how much speed would this body give?

4—What would be the approximate cost of the job?—George Huycke.

1—A very racy appearing job could be constructed along the lines shown in the sketch, Fig. 1. This permits the use of the same hood, fenders and chassis. It would not be advisable or in fact possible to lower the steering wheel more than is shown in the illustration. The seating can be made very low by hanging the seats below the frame on cross members made of strap steel.

2—With the body alterations made in accordance with the diagram this model, in proper mechanical condition, should be capable of 70 m.p.h. or more. It would hardly seem necessary that the flexibility of the car be impaired by the use of higher gearing.

3—Inasmuch as this engine is equipped with aluminum pistons and the designers have given particular attention to the lightness of reciprocating parts there is really little which could be done profitably to increase the speed, unless it might be to set the ignition and valves ahead.

4—The cost would depend entirely upon the facilities available for doing the work. A body builder could turn it out at much less expense than a mechanic not equipped for anything but hand work. However, we should say that \$400 to \$500 carefully spent would do the work.



Fig. 6—Wiring for Hilo headlight bulb











THE FUTURE OF THE FUTURE

The future is a complex and multifaceted concept that has fascinated humanity for centuries. It is a subject that has inspired artists, writers, and philosophers to explore the possibilities of what is to come. In the modern era, the future has become a topic of intense interest and speculation, particularly in the context of technology and the environment. As we stand on the brink of a new era of discovery and innovation, it is essential that we take the time to reflect on the future and the role that we, as individuals and as a society, will play in shaping it.

One of the most significant challenges facing humanity in the future is the impact of climate change. The scientific consensus is clear: the Earth's climate is warming, and the consequences could be catastrophic. Rising sea levels, extreme weather events, and the loss of biodiversity are just some of the potential outcomes. It is our responsibility to take action now to mitigate these risks and to ensure a sustainable future for generations to come.

Another major challenge is the rapid pace of technological advancement. While technology has brought us many benefits, it has also created new risks and uncertainties. Artificial intelligence, for example, has the potential to revolutionize many aspects of our lives, but it also raises questions about privacy, security, and the future of work. We must navigate these challenges carefully, ensuring that technology is used for the benefit of all and that we maintain control over our own destiny.

Despite these challenges, the future is not without hope. There are many reasons to be optimistic about the future. We have the knowledge and the resources to solve the world's most pressing problems. We have the creativity and the ingenuity to develop new and innovative solutions. And we have the capacity to work together and to build a better world for ourselves and for future generations.

The future is a blank canvas, and it is up to us to paint it. We must take responsibility for our actions and for the future of our planet. We must work together to address the challenges we face and to create a future that is bright and full of promise. The future is not just something that happens to us; it is something that we can shape. And it is up to us to make the most of it.

The future is a complex and multifaceted concept that has fascinated humanity for centuries. It is a subject that has inspired artists, writers, and philosophers to explore the possibilities of what is to come. In the modern era, the future has become a topic of intense interest and speculation, particularly in the context of technology and the environment. As we stand on the brink of a new era of discovery and innovation, it is essential that we take the time to reflect on the future and the role that we, as individuals and as a society, will play in shaping it.

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of buildings. The initial plant will cost about \$5,000,000 and will occupy only one-fifth of the total area of the Easington plot.

Na Peer Tire Co.—The Na Peer Tire Co., Akron, Ohio, has increased its capital from \$20,000 to \$400,000.

Flischer-Griffin Storage Battery Co.—The Flischer-Griffin Storage Battery Co., Cincinnati, Ohio, has increased its capital from \$10,000 to \$50,000.

Products for Care of Car—The Auto Products Mfg. Co., Inc., Buffalo, N. Y., has been organized to make specialties for the care and upkeep of the car. These include Rub-R-Tite top patch, No-Stitch cement, lining dyes, varnish and other similar products.

Victor Rubber Co. to Add—The Victor Rubber Co., Springfield, Ohio, has awarded a contract for a second story to the plant, which will more than double the present floor space available for manufacture. The plant has been in continuous operation night and

day for more than two years. Contracts have been closed recently with four new distributors. The company makes rubber motor car mats and pneumatic tires and tubes.

Columbus Auto Parts Co.—The Columbus Auto Parts Co., Columbus, Ohio, has increased its capital from \$25,000 to \$75,000.

Studebaker Branch Entertains—R. D. Hawley, manager of the Columbus, Ohio, Studebaker branch, entertained about fifty of his dealers at a luncheon recently. J. C. Hahn, treasurer of the Studebaker Sales Co., and C. E. Dean, general sales manager, talked on the freight car situation.

Goodrich Offers Aid to U. S.—The executive committee of the B. F. Goodrich Co., Akron, Ohio, is reported to have authorized the president of the corporation to offer the Government the plant's resources in emergency. The company could furnish immediately solid rubber tires for heavy-duty

trucks, pneumatic tires for lighter cars, air mattresses, blankets and air pillows, rubber clothing and other articles.

Cook Joins Akron Forces—C. E. Cook, formerly Pacific Coast manager for the B. F. Goodrich Co., has been placed in charge of the Goodrich branches and is now a part of the factory organization. Frank R. Carroll, who has been manager of the Los Angeles branch, succeeds Mr. Cook as manager of both the San Francisco and Los Angeles branches.

Gramm-Bernstein to Expand—The R. E. Taylor Corp., New York, has taken over the sale of the trucks made by the Gramm-Bernstein Co., Lima, Ohio, and the plant will be enlarged to increase the production. The capitalization of the Gramm-Bernstein company was increased from \$500,000 to \$4,000,000 recently. The Taylor corporation will have control of wholesale and retail sales and service stations.

Aberdeen, S. D.—M. M. Stewart Co.; capital stock, \$20,000; incorporators, M. M. Stewart and Jean B. Stewart.

Auburn, Ind.—Double Fabric Tire Co.; to manufacture motor car tires; capital stock, \$500,000; incorporators, William H. Willenar, A. L. Murray, Simon J. Straus and Isaac D. Straus.

Cleveland, Ohio—K-D Carburetor Co.; capital stock, \$275,000; to manufacture carburetors; incorporators, Harrison B. McGraw, H. E. Downing, M. C. Russ, M. H. Gallagher and M. L. Thomsen.

Cleveland, O.—Denison Square Garage, Capital stock, \$5,000; incorporators, Chas. J. Atkinson, Annie M. Atkinson, George L. Durkin, F. M. Fansworth and Lee Skeel.

Cleveland, Ohio—Consolidated Products Co.; capital stock, \$250,000; incorporators, W. E. Hamperly, John V. Hammersmith, Samuel Mollert, John J. Donahue, A. A. Hammersmith.

Cleveland, Ohio—Malbohm Motor Sales Co.; capital stock, \$15,000; to sell motor cars, incorporators, W. H. Hasselman, Helen M. O'Boyle, L. E. Yagel, R. E. Koby and W. G. Radcliffe.

Cleveland, Ohio—Motor Repair Mfg. Co.; capital stock, \$10,000; to operate a repair shop; incorporators, John A. Nally, E. G. Nally, K. M. Kneale, Fred C. Horning and William W. Hysell.

Cleveland, Ohio—Britton Carburetor Co.; capital stock, \$50,000; incorporators, L. M. Diehl, A. C. Diehl, P. C. Jones, C. F. Schultz and G. C. Middleton.

Cleveland, Ohio—Prospect Auto Top & Painting Co.; capital stock, \$20,000; incorporators, John Meyers, L. B. Horstman, R. F. Horstmann, Charles W. Reppert and L. M. Butler.

Cleveland, Ohio—Elgin-Cleveland Co.; capital stock, \$10,000; to sell motor cars; incorporators, N. C. Ralph, M. Boebriker, Thomas Fricker, J. L. Smith and L. M. Nook.

Columbus, Ohio—Are Auto Heater Co.; capital stock, \$10,000; to manufacture motor car heaters; incorporators, K. E. Strain, H. E. Dawson, George J. Wahlenmaier, D. C. Badger and B. J. Snyder.

Columbus, Ohio—Carroll-Ford-Edgar Motor Co.; capital stock, \$10,000; incorporators, W. S. Carroll, H. F. Ford, H. L. Edgar, John W. Glass and N. Bales.

Cincinnati, Ohio—Overman-Borgmann Co.; capital stock, \$5,000; to operate a taxicab company; incorporators, Katie Overmann, Bernard J. Borgmann, Marie Overmann, Elsie Overmann and L. J. Brumleve.

Cincinnati, Ohio—Metzger Welding Co.; capital stock, \$10,000; to do motor car welding; incorporators, George D. Metzger, George Metzger, R. C. Pierce, M. D. Warren and E. W. DeWitt.

Canton, Ohio—Keller Motor Co.; to operate a garage and motor car sales agency; capital stock, \$10,000; incorporators, A. F. Keller, O. F. Keller, C. W. Keller, Code Keller and Margaret Keller.

Chicago—Wagny-Kettlerwell Motor Co.; capital stock, \$10,000; incorporators, Walter D. Herrick, L. M. Brenner and M. E. Taylor.

Chicago—Broadway Motor Sales Co.; capital stock, \$10,000; incorporators, J. Miloskowsky, Sophia L. Miloskowsky and Sarah Miloskowsky.

Davenport, Iowa—Altenberg Tire & Rubber Co.; capital stock, \$25,000; incorporators, R. B. Altenberg, H. M. Rose and Harry Altenberg.

Dayton, Ohio—Stopuncture Co.; capital stock, \$10,000; to deal in tires, incorporators, Joseph F. Gersbacher, Eugene Wilcke, John B. McClary, John C. Cruise and Louis R. McClary.

Dubuque, Iowa—Belsky-Cook Motor Co.; capital stock, \$50,000; incorporators, Charles J. Belsky, Lester Cook and J. M. Belsky.

Recent Incorporations

Eau Claire, Wis.—Kinney Motor Car Co.; capital stock, \$50,000; to deal in new and used motor cars, operate garage, etc.; incorporators, Ole G. Kinney and C. A. Kinney.

Everett, Wash.—Bell Transfer Co.; capital stock, \$10,000; incorporators, E. J. Dwyer, J. E. Bell and William Brown.

Frankfort, Ky.—Franklin Motor Car Co.; capital stock, \$20,000; incorporators, William M. Phillips, B. F. Stone and Stanley Stone.

Footoria, Ohio—Dale Body Co.; capital stock, \$150,000; to manufacture bodies; incorporators, F. D. Kingsed, M. A. Thomas, Don. O. Mickey, George E. Schreiff and W. O. Allen.

Green Bay, Wis.—Peerless Tire & Rubber Co.; capital stock, \$50,000; incorporators, F. E. Burrell, John P. Jensen and A. W. Brown.

Indianapolis, Ind.—Swag Auto Lock Co.; capital stock, \$5,000; incorporators, Frank Schwegman, Richard C. Waller and E. App.

Indianapolis, Ind.—Sternwear Tire & Tube Supply Co.; capital stock, \$300,000; incorporators, L. C. Mullins, E. C. Mullins and E. R. Millett.

Indianapolis, Ind.—Marathon Tire Sales Co. of Indiana; capital stock, \$25,000; incorporators, R. P. Oblinger, H. E. Rasmussen, M. M. Fancher, J. D. Meek and W. R. Jenks.

Kansas City, Mo.—Double Drive Motor Co.; to manufacture motor cars and tractors; capital stock, \$500,000; incorporators, Walter Beck, Theodore Dittmar and S. B. Gatewood.

Lancaster, Ky.—Rex Garage Co.; capital stock, \$5,000; incorporators, W. D. Hammack, W. F. Champ, B. F. Gregory and Henry Moore.

Lakewood, Ohio—West Clifton Boulevard Garage Co.; capital stock, \$10,000; incorporators, R. J. Sullivan, John A. Nally, Fred C. Horning, K. M. Kneale and E. C. Nally.

Madison, Wis.—Kinney Motor Co.; capital stock, \$50,000; incorporators, O. G. Kinney, W. J. Moe and C. A. Kinney.

McKeesport, Pa.—Standard Auto Truck Co.; capital stock, \$10,000; incorporators, R. L. Henderson, James Henderson and J. W. Butler.

Mansfield, Ohio—Nuchan Auto Supply Co.; capital stock, \$10,000; to sell motor car supplies; incorporators, Claude Marks, Henry P. Kipp, Albert Wentz, Haid D. Painter and Eloise Sloane.

Moline, Ill.—Brown Motor Co.; capital stock, \$20,000; incorporators, Walter E. Brown, James E. Johnston, I. E. Stanton, Henry H. Hutton, G. L. Boston and Paul A. Riggs.

Mattoon, Ill.—Mattoon Motor Car Co.; capital stock, \$20,000; incorporators, F. A. Brooks, W. E. Lumpkin and John McNutt.

Minneapolis, Minn.—Willard & Sturr Motor Co.; capital stock, \$10,000; incorporators, Frank L. Sturr and Charles and Bernice Willard.

Marshall, Mich.—All-Season Body Co.; capital stock, \$500,000; to make motor car bodies; incorporators, J. A. McAvoy, M. Ackett, R. Trice and F. A. Bothwell.

Milwaukee, Wis.—Mulkern Auto Livery Co.; capital stock, \$150,000; incorporators, Frank Mulkern, Helen G. Mulkern and Frank X. Boden.

Nashville, Tenn.—Southern Truck & Tractor Co.; capital stock, \$10,000; incorporators, John R. Boxley, W. R. Chambers, F. M. Farris, J. M. Smithson and Ebert Sullivan.

Newark, N. J.—Day-Elder Motors Corp.; to manufacture motor cars and trucks; capital stock, \$45,000; incorporators, Charles P. Day, Fred O. Elder and Theodore McC. Marsh.

Pontiac, Mich.—Pontiac Tractor Co.; to manufacture tractors, engines and spraying machines; capital stock, \$42,000; incorporators, Norman A. Wright, Fred S. Welch and M. D. Hubbard.

Plymouth, Wis.—Plymouth Auto & Supply Co.; capital stock, \$15,000; incorporators, Henry Tohl, Fred Kissinger, Henry and John Ter Maat.

Quincy, Ill.—Stone Tractor Mfg. Co.; capital stock, \$100,000; incorporators, G. M. Stone, W. Brady and J. Leslie Fulton.

Reading, Pa.—Dundore Mfg. Co.; capital stock, \$75,000; to make motor car parts and accessories; incorporators, Charles S. Dundore, Edwin S. Smith, W. Wray Stewart and D. Elmer Worley.

Racine, Wis.—Racine-Western Sales Co.; capital stock, \$5,000; to manufacture and market metal polish, etc.; incorporators, W. L. Gittings, J. E. Davies and C. C. Gittings.

Elkton, Mo.—Parish Motor Co.; capital stock, \$7,000; incorporators, L. J. Parish, John Fox and L. J. Ables; to carry on a general motor car business and conduct a motor car livery and repair shop.

Seymour, Wis.—Service Auto Co.; capital stock, \$20,000; incorporators, L. H. Walte, William Beck and August Holtermann.

Seattle, Wash.—National Auto Signal Co.; capital stock, \$25,000; incorporators, W. E. F. Gibson and C. L. Whelan.

St. Paul, Minn.—V. O. D. Motor Car Co.; capital stock, \$50,000; incorporators, Dr. A. A. Van Dyke, P. M. Davison and O. W. Olson.

St. Louis, Mo.—Combination Auto Lock Co.; capital stock, \$10,000; incorporators, W. B. Bathaser, George A. Abel and H. F. Fouling.

St. Louis, Mo.—Reichel Motor Co.; capital stock, \$40,000; incorporators, Theodore Reichel, John W. Hatton and D. W. Acuff; to manufacture and deal in motor cars.

Toledo, Ohio—Interstate Motor Trucking Co.; capital stock, \$50,000; incorporators, Grover Luckner, William F. Gridley, A. A. Gridley, E. D. Oliver and Robert M. Oliver.

Toledo, Ohio—Ohio-Belmont Motor Co.; capital stock, \$125,000; incorporators, A. T. Wilson, R. W. Beaschler and Andrew A. Lehr.

Warwick, Ohio—Bearding Rubber Mfg. Co.; capital stock, \$25,000; incorporators, William H. Harter, Leonard T. Croft, Mary R. Rhoads, Mary R. Harter and Joseph A. Whittecar.

Wheeling, W. Va.—Motor Sales Agency; capital stock, \$10,000; incorporators, William C. Church, R. J. Browning, A. T. Otto, H. M. Russell, Jr., and Mary Browning.

Whitewater, Wis.—Whitewater Garage Co.; capital stock, \$10,000; incorporators, A. A. Dietzel, E. Drowy and K. C. Strachan, to do a general sales and garage business.

Zanesville, Ohio—Motor Vehicle Co.; capital stock, \$20,000; to sell motor cars; incorporators, C. F. Hearing, W. M. Bateman, H. W. Hendrixson, R. S. Van Deuse and Edward R. Meyer.

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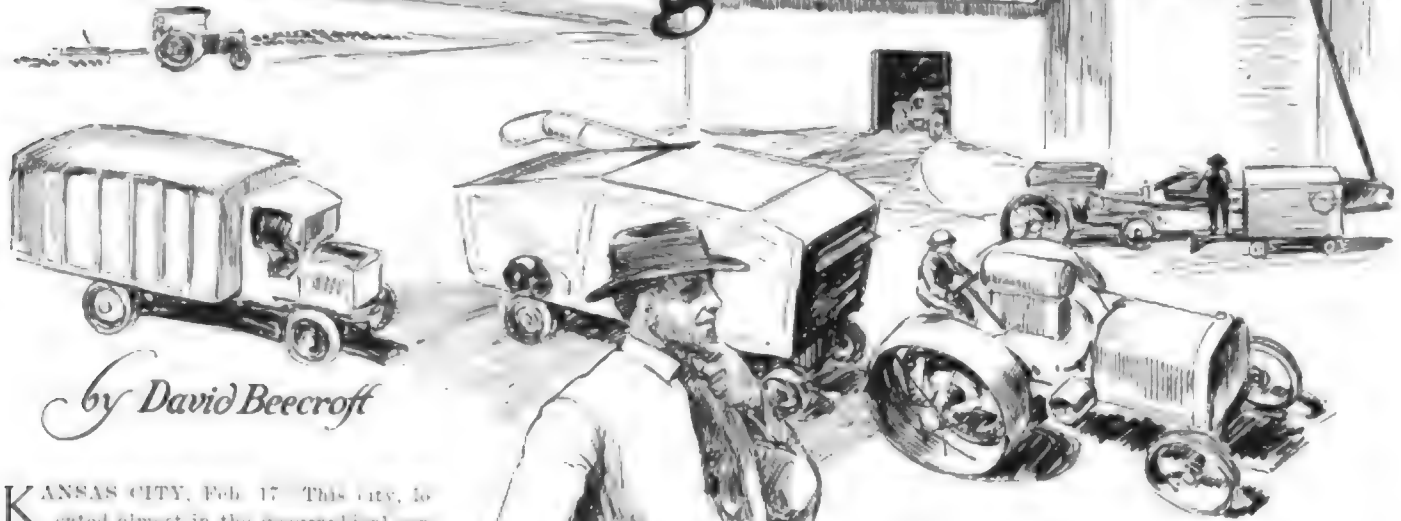
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MOTOR AGE

Powerizing the Farm



by David Beecroft

KANSAS CITY, Feb. 17. This city, located almost in the geographical center of the country, has enjoyed the distinction of being the only city in the country to stage a two-ring show circus, if the expression may be used as referring to the national farm tractor show held here as well as to the large motor car show.

Kansas City has gained the distinction of being the farm tractor center of this country. The wheat production center is northwest of the city near the northeast corner of Nebraska; the oat production center of the nation is directly north in Iowa; the corn center of production is almost directly east in Illinois; the center of cotton production is directly south in Arkansas; and finally to clinch the argument the complete farm production center of the country is located just southwest of the city in Missouri.

Qualifies as Tractor Center

So does Kansas City qualify as the tractor center of the country and so does this fair city of the Missouri Valley qualify as the proper center for the national tractor show. Just as New York and Chicago lay claim to the two national motor car shows, so Kansas City proclaims its right to the national tractor show.

A year ago the first big tractor show was staged in a huge tent here; this year the second show is staged in the same place but under a much bigger tent and with vastly improved conditions. Kansas City owes its right as the tractor center to the activities of the Kansas City Tractor Club. This is a selling organization of a score and

a half dealers who market tractors. More than 14 months ago they conceived the idea of getting together in a club. Two months later they put on the show of a year ago. They have grown since and are to-day the recognized tractor club of the country.

But this Kansas City tractor club has

accomplished something greater than just to stage a show. It has focused the attention of the entire country and foreign lands on the farm tractor, and this week there have been representatives from foreign lands and dealers from every state present to examine the new tractor.

Tractor Industry Attracts Engineers

Further: The activities of the tractor club attracted the attention of the Society of Automobile Engineers, the engineering organization of the motor car industry. This organization invaded this city this week and held a huge tractor banquet Wednesday night at Hotel Baltimore with 162 tractor boosters on hand. But the engineers have gone further and have started their big work of standardizing tractor parts just as they standardized motor car and motor truck parts and are to-day standardizing aviation parts. It is this standardization of small parts that has made the enormous production of motor cars possible; it is this standardization of parts that the airplane people are looking to to make large production of airplanes possible; and in turn the tractor makers are hoping by extending this good work to make farm tractors cheaper and to be able to build them in much larger quantities and also to vastly improve their designs and get them looking more alike than they do at present. Engineers are just as essential to tractor work as to aviation, motor car or motor boat manufacture.







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3. The third section of the document is the introduction. It provides background information on the topic and states the purpose of the study. It is located below the abstract.

4. The fourth section of the document is the methodology. It describes the methods used in the study, including the data collection and analysis techniques. It is located below the introduction.

5. The fifth section of the document is the results. It presents the findings of the study, including any statistical analysis. It is located below the methodology.

6. The sixth section of the document is the conclusion. It summarizes the main findings of the study and provides recommendations for future research. It is located at the end of the document.

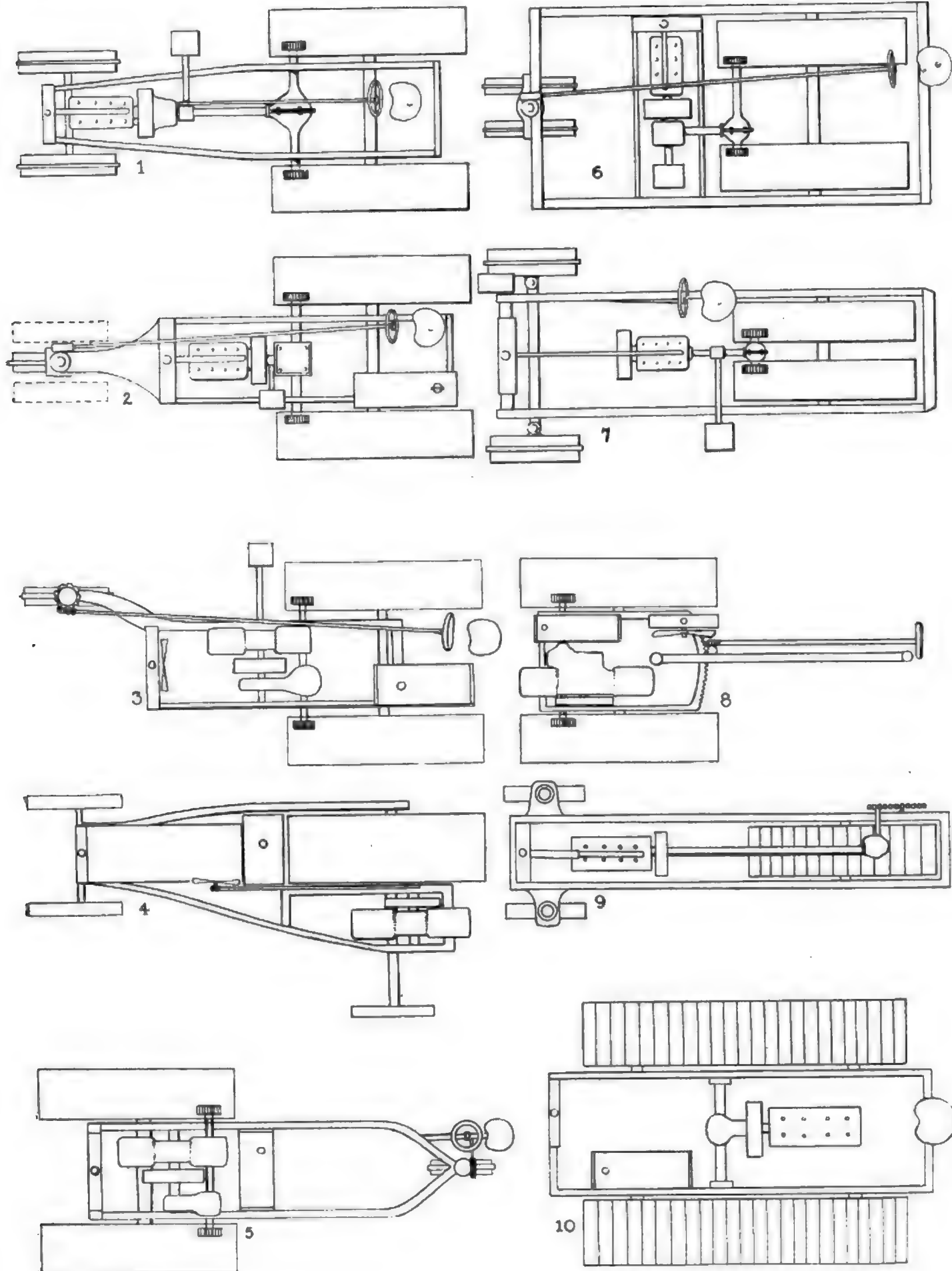








Figure 1. Mean annual precipitation (mm) for the years 1970, 1980, 1990, 2000, 2010, 2020, 2030, 2040, and 2050.



Cars Delivered on R. R. Schedule

Trains of Buicks with Conductor and Traffic Manager—How Chicago Gets Allotment

CHICAGO, Feb. 20—Driving motor cars overland in trains having a pilot and a conductor on definite schedule with a train dispatcher, track maintenance crew and all the other features of a well-regulated railway system has been the outgrowth of the almost complete embargo of motor car freight on railways since the first of the month. The U-boat warfare which resulted in the embargo declared by thirty railroads has resulted in tying up more than \$10,000,000 worth of motor cars in Detroit, but it also has resulted in the development of a new method of getting cars to dealers in quantities, independent of freight conditions, and one which probably will be one of the chief features of delivery to dealers even after railroad conditions become normal.

The Buick branch at Chicago during the last week has received over \$1,000,000 worth of motor cars from the factory at Flint, Mich., by overland delivery. This has been made possible only by the very finest organization and most complete arrangements for getting the cars out of the factory and seeing that they are put over the road without delay and without accident.

Cars No Worse for Drive

All winter cars for the territory tributary to the Buick branch at Chicago have been driven overland in small quantities but, with the increase of congestion at the beginning of this month, it became necessary for all the dealers served from this branch to depend almost entirely on cars driven over the road for their allotments. Since Feb. 6, when the first quantity delivery of Buicks to this territory commenced, over 1200 Buicks have conquered snow drifts between Flint and Chicago, and with a few exceptions all have arrived in as good condition as when they started, needing only a washing and polishing. Feb. 6 fifty-three cars were sent away from the factory to the Chicago branch, and since that time as many as 130 a day have been making the two-day trip to the local branch. Only two of these during the entire time have had to be abandoned temporarily and those on account of irresponsible drivers sent out on the first day.

To accomplish this has required a very thorough, if hastily arranged, organization, and for this much credit is due to Manager Burke of the Chicago branch, who was chiefly instrumental in installing the system. Manager Burke's office reminds one of the train dispatcher's office from some mammoth railroad system. Every minute reports are coming in by telephone and telegraph from some one of the 250 to 300 cars that are on the

road to-day. He has his finger on every one of them and has special representatives from the branch at five different points along the route.

The pilot knows the route thoroughly and has a list of stopping places. Each driver is supplied with a list of the towns passed through and definite controls are established. The drivers are instructed to pay no attention to the cars behind them and to make no stops unless the car in front of them stops. The last car, carrying the conductor, carries also such spare parts as valves and spark plugs, two shovels and a tow rope for work in the drifts. If any car should stop on account of difficulties, all those behind this stop and the conductor can render first aid.

Pilot Watches for Trouble

In case the last two cars do not show up at any control, the pilot goes back in his car to see if additional aid is necessary. The branch at Chicago is notified whenever the train reaches a control and is notified from the nearest town if there is a case of unavoidable stoppage. This usually can be done within 15 min., and should a new part be necessary it can be on the way from the Chicago branch within 30 min. after the accident happened. Special representatives from the factory are stationed at Bryan, Wauseon, Kendallville, South Bend and LaPorte and Valparaiso and are in constant touch with the factory.

The exceptionally bad weather conditions during the time the driveaways have been under way have increased the difficulties very much. Below zero temperatures and roads impassable with snow-drifts made it necessary to take exceptional measures to keep the roads open. The Buick factory helped materially in this by having eight or ten trucks on the road all the time, filled with men and shovels who kept the drifts cleared out between Flint and the point where the road joins the Lincoln highway. The mere passage of the trucks themselves over the roads helped in keeping the way open.

TO CONTROL TORBENSEN AXLE

Alma, Mich., Feb. 19 — The Republic Truck Co. is planning to obtain control of the Torbensen Axle Co. of Cleveland. The plan will allow the Torbensen company to continue the manufacture of axles for practically any concern that wants to purchase them and calls for an increase of capital stock in the Republic company, whereby 15,000 shares of new stock would be offered to stockholders at \$100 per share. The Republic company expects to get control of all the issued common stock of the Torbensen concern.

There were some human elements which also added to the difficulties, particularly at the early stages of the driveaways. One of these was the avarice of the farmers along the route, who attempted to grow rich suddenly by charging fees of anywhere from 25 cents to \$1 for each car for permission to go through their fields to avoid impassable drifts. Over-zealous local authorities in one instance caused a great deal of delay. This was in South Bend, where every driver was arrested, and taken to the police station for passing through the town without a license.

Though no fines were assessed, delay and trouble were caused by the short-sighted authorities. As soon as the business men of the town, however, became aroused to the fact that the trains were being detoured around the city, pressure was brought to bear, which caused a decided change in front of the local authorities. So much so in fact that a policeman now meets each train, gets in with the pilot and acts as pathfinder to the hotel or garage and thence to the outskirts of the town with all courtesy.

The cars have come through none the worse for their experience; in fact, the engines have been in better shape when they arrived than when they started. The bodies have needed only washing and polishing to restore their brilliant finish. Of course it is a little more expensive than freight shipment. The freight charge from Flint to Chicago is \$18.50. Cars are sent overland now at an average cost of \$22.50. This has come about through proper organization and improved weather and road conditions, as the cost was double that at the first of the month.

Rules Are Stringent

Arrangements for getting the cars away from the factory and keeping them in an uninterrupted movement over the roads are as complete, and the rules are as stringent as they have been for the truck trains operating with the army in Mexico. Burke is in touch with his dealers throughout the states of Wisconsin, Iowa, the northern peninsula of Michigan, Illinois and northwestern Indiana and notifies them when they can get cars at the factory. The dealer then notifies Burke of the number of cars of each type wanted and brings with him to Chicago one man for each car to be driven back. The Chicago branch then makes arrangements for special cars and, in some instances, special trains to take the day's allotment of dealers and their men to Flint. Breakfast is served on the train before it reaches Flint, and buses meet the men at the station and they are hurried to the factory.

Arrived at the factory, the dealer hands to a representative of the Chicago branch his check for the cars he is to get and he is given a numbered requisition for each car. When the dealer arrives at the factory, those cars are ready for him. The factory, which has been notified previously as to the dealers' wants, has been working all

Freight Embargo Ties Up Cars

Driveaways and Express Shipments Resorted to—Snow and Mud Worry Road Crews

night getting the cars in shape for the drive. Each car is tuned up for the road, has had its radiator filled with a mixture of water and alcohol, has 10 gal. of gasoline in the tank and has oil and grease. As the dealer turns his requisitions over to a dispatcher at the factory, the cars are called by number and the dealer's driver takes his place in the car and is away.

So well worked out are the plans that there is only the slightest delay at the factory. One instance will show the quickness with which the cars are gotten away. One of the Grand Trunk trains got into Flint the other morning at 8:30 with a party of dealers and men, and 20 min. later the first cars had started on their way to Chicago. At the present time 275 cars a day can be got away from the factory for their overland drive.

In Chicago Territory

CHICAGO, Feb. 17—Seriousness of the car shortage situation is exemplified by the fact that in the last week the Oakland Motor Co., Pontiac, Mich., has not shipped a car from its factory by train. Practically every company in Detroit and other Michigan points are obliged to make what shipments they do on flat cars. Even though the present situation is severe, there promises to be little hope of betterment for a month, even if the plans of the railroads and the Interstate Commerce commission move along the most ideal lines. Practically every available car will be used to rush foodstuffs to the East and with such a large number of cars tied up on sidings in the East awaiting unloading, and a curtailed number of available locomotives on some roads, it does not augur well for the motor industry. Dealers in Chicago predict that unless the situation improves soon it will be necessary for every dealer who wishes to sell cars to go to the factory and drive them through to his city.

Michigan for the last few weeks has seen great bodies of cars sweep down through the state toward Chicago and the territory contiguous to Chicago. The Tennant-Oakland Co., handling the Oakland in the Chicago territory, drove ninety cars from the factory last week and forty-two this week. The trip from Pontiac averages 28 hrs. Roads are anything but good.

Freight Car Situation

Chicago is getting not to exceed 60 per cent of its requirements in freight cars, but everything being furnished must go for handling foodstuffs and perishables. Cars are being cleared through the Chicago yards in 48 hrs., according to H. C. Barlow, traffic manager for the Chicago Association of Commerce. Mr. Barlow made the statement that the railroads are now prepared to handle business more effectively than at any other time in several weeks and if the weather keeps good it will only be a question of thirty days before the situation will be almost, if not quite, back to normal.

The Falls Motors Corp., Sheboygan Falls,

Wis., is forwarding engines to its customers beyond Chicago in carload lots by express because of the freight traffic situation. One of the largest users of Falls motors is the Grant Motor Car Corp., Cleveland, and several express cars are loaded each week to keep the factory supplied with motive units while the freight tangle continues.

More Cars in Columbus

The Hudson Company drove 125 cars to Columbus from the factory in Detroit and from this point shipped them to various parts of the country. Available cars in Columbus are more numerous than in Detroit.

The Haynes Automobile Co. of Kokomo, Ind., is driving cars overland. Fifty touring cars were delivered to Detroit, Mich., in this manner last Tuesday, and twenty-five cars left for the same destination last Friday night. Since the freight embargo delayed shipments the company has shipped cars under their own power as far east as Johnson City, N. Y., a distance of 790 miles.

Manager Dashiell of the Chicago Dodge branch has had a crew of ten men on the road all of the time since December 1. He now has twenty men in constant trips and is getting in thirty to forty cars a week overland. In addition Dodge cars have been shipped through the winter in express cars holding from four to five motor cars. Now, however, the embargo is being extended to shipments by express. Dashiell is increasing his force of drivers and has them under a picked crew manager.

10-ft. Drifts

Chicago, Feb. 19—Both snow drifts and mud have increased the difficulties of road delivery. Snowdrifts 6, 8 and even 10 ft. deep were encountered and one crew progressed 6 miles in 6 hr. 45 min., most of which was accomplished by hand shoveling. Another crew reports the use of 20 teams all night on one trip.

Now that the temperature has moderated many of the crews are driving at night, stopping when the sun softens up the roads to mud. This is to prevent one of the chief difficulties of overland delivery—mud spots on freshly varnished bodies. Those with enameled bodies do not have as much difficulty as the mud does not seem to affect them so much as it does the varnished surfaces.

Several dealers report that by covering the bodies with a coating of prepared wax without polishing, the varnish is entirely protected from the mud. The wax is later washed off with gasoline and the original polish reappears.

DETROIT, Feb. 19—More than \$10,000,000 worth of motor cars are tied up here because of existing freight conditions produced by embargos declared by thirty railroads since the beginning of the U-boat war. These figures are based on a statement made by J. S. Marvin, general traffic manager of the National Automobile Chamber of Commerce, who says unless something improves matters radically in the next few weeks the situation will become even more serious. Mr. Marvin found more than 25,000 empty freight cars tied up in Chicago.

The Packard company has about \$1,000,000 worth of cars tied up and is driving its products to Toledo, Cleveland and Columbus. The Ford Motor Co., which requires at least fifty empties daily, is getting from six to ten each day. Dodge Bros. are sending cars under the driveway rule and are shipping an average of 150 a day. The Cadillac Motor Car Co. has 1000 cars ordered, paid for and ready for shipment which it has been forced to place in storage because of lack of shipping facilities. The Paige-Detroit company is in the same position with a similar number of cars.

The Chalmers company has 300 cars in storage and is threatened with a shortage of material. More than 400 cars lay idle at the Hupp Motor Co. plant with little prospect of early shipment, and the company has been paying express charges of \$250 a day to get materials from Cleveland.

Maxwell, Hudson, King and other big concerns are having the same troubles and all are busy fitting their products for the drivers from the different agencies who come to drive the cars over the roads to their home towns. Many companies are driving their cars to nearby cities, where they hope to secure better shipping facilities.

BREAKS PRODUCTION RECORD

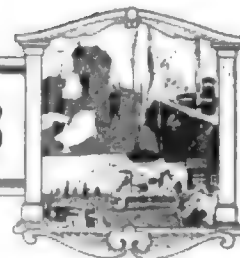
Detroit, Feb. 19—On Jan. 31, the Continental Motors Co. at Muskegon, Mich., turned out 360 finished engines, which is forty-six engines more than it ever turned out in a single day. During January the company produced 6536. The December record was 5556.

MULFORD TO DIRECT RACERS

Detroit, Feb. 19—Ralph Mulford will hold the star racing wheel for the Hudson Motor Car Co. this year. There will be at least five super-sixes in the racing game for 1917. Arthur Hill, formerly of the Peugeot team, will be the manager, and Billy Chandler will be master mechanic and in charge of the pits.



EDITORIAL PERSPECTIVES



Tractors Are Developing

THE farm is being powerized just as the motor car powerized the country during the last 15 years. Tractor manufacture is not in the production class at present, but it is getting there as rapidly as it can. The farmer has had money enough to buy perhaps a million motor cars, and he is now ready to buy a million or more tractors. The 6,000,000 farmers in the country surely should be able to absorb that many machines and it may be double and treble that number.

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TRACTORS for the farm are coming, because higher farming efficiency demands them. Powerizing the farm with engine power means more than a mere substitute of the gasoline engine for the proverbial horse. The tractor makes intensive farming necessary. Agricultural chemists have proved that land plowed in July produces much better crops than land plowed in other months. This applies to winter wheat. There is a chemical explanation for it. More nitrates are retained in the soil. It is not imaginary or even guess work. It is a demonstrated fact. Now the farmer has not done nearly so much plowing in July as he should. The Kansas farmer with humanity sticking out all around has not cared to work the horse in the heat of July and by his humanity has been losing money. For next year 25 per cent of the winter wheat in Kansas will have to be plowed up and other crops sowed. This largely could have been overcome, so the chemists say, by plowing in July. Here is where the tractor becomes

more than a mere substitute for horse power. It becomes an intensive farmer: in short, a scientific farmer.

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THIS is but one example of what powerizing the farm means, and it is no wonder that tractor makers are enthusiastic and that scientific farmers are trying to tell all other farmers just why the tractor is necessary to supply the wants of this great nation. Already we are not growing enough grain for home use, and to care for our exports. We have really been importing. The tractor will not only make farm work quicker, but it will make it better, and best of all will increase the yield from a given number of acres.

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THE great Mississippi valley, the finest farming land in the western hemisphere, will be a richer valley because of the farm tractor. It is possible that bread in the city will be a moiety cheaper because of the farm tractor. The engineering world really has accomplished more than it set out to accomplish, because it was to sell tractors that started the movement and the thought of greater production along the lines outlined were not known of at that time. Every invention brings with it unlooked-for benefits, and while the tractor can work 24 hours a day in July if necessary, it is not only saving the horse at such times but it is also adding to the annual income of the farmer.

Compulsory Driveaways

IN years past, it was one of the favorite methods of large dealers in attracting attention to some large delivery of cars to their territories and in getting their sub-dealers together to meet them all at the factory and amidst much red fire and enthusiasm, deliver the cars overland in a great cross-country parade. This winter it is an almost hourly occurrence in our larger car-manufacturing centers.

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NOW there is little of the display that characterized the starting of the driveaways of other days. Instead of being a good publicity stunt it now is a matter of sheer necessity, if the dealer is to receive his car without a delay of weeks or months. The railroad freight traffic situation is accountable for the delivery of hundreds of cars under their own power every day from Detroit and the other motor car manufacturing centers.

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TO deliver a car in this way for any great distance need not be considered a financial saving to the dealer, for it

costs as much if not more than the usual freight rates. One Chicago dealer estimates an expense of \$30 for every car he brings overland from Detroit. However, it does offer the dealer an opportunity to get to the factory with those who are working in the territory with him. Wherever dealers gather, tales are told of twenty to fifty cars stuck in mud or snowdrifts on these enforced reliability tours. For the driveaway suffers all the road hardships also.

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QUITE naturally, the dealer and the motoring public is impressed first by difficulties of delivery of the finished car. There is another angle to the situation which may become of even graver import. That is the fact that it is almost as difficult to get material and fuel into the motor car factory as it is to get the completed product away. Most of the manufacturers have been sufficiently far-sighted to see that their stocks are, so far as possible, on hand. But if the present congested state of freight transportation continues, we may look for very decided curtailment in production.

Pre-Touring Issue

THIS week—Vicksburg and New Orleans; April 5—Vicksburg and New Orleans and the rest. For if you have been reading MOTOR AGE each week you learned last week what April 5 meant—the annual touring issue and the biggest, best and all the other desirable superlatives that could tell you MOTOR AGE had in store for you the most helpful, practical issue yet published for motorists.

THE map this week shows you some of the possibilities of travel down in the region of Vicksburg, Miss. and New Orleans, La. Of the north and south routes the Jackson highway takes you all the way to New Orleans. Jackson is the center of roads that lead to New Orleans and to Vicksburg, as well as west and north and the coast line goes through Pass Christian, Gulfport and Biloxi, which together are often re-

ferred to as the Riviera of America. The river line goes through Baton Rouge to Jackson and from there to Vicksburg and its national monument.

WITH New Orleans most Americans are familiar. Situated as it is, near Lake Ponchartrain, Lake Maurepas and Lake Borgne, the city offers an ideal objective point for motorists who like to fish and hunt. Famous as it is for its carnival, the city needs no further reason for attraction to itself.

JUST below New Orleans, you remember, General Jackson won his victory in a post war battle in 1915. Both Missis-

issippi and New Orleans are of historical interest. Both were instrumental in shaping the country's character, and in Vicksburg and New Orleans we have the acme of historical interest.

AS THE last issue of **MOTOR AGE** announced, each issue prior to the April 5 issue will contain a map showing the roads and opportunities of some section of the country. Vicksburg and New Orleans will be followed by other sections in which touring either is possible now or will be soon. The California coast and Arizona and New Mexico will be treated in turn.

Twenty Cars to Travel Together from Pacific Coast to St. Louis This Spring

PACIFIC Coast motorists are planning to come enmass to the Mississippi this spring. The Advertising Club of San Francisco is sponsor for the project, and the tentative plan is to come East to St. Louis from San Francisco over the most beautiful scenic route the country offers. The immediate object is to get the 1918 advertising convention for San Francisco.

The route is planned for thirteen days. It will include the canyon of the Arkansas and the Royal Gorge and extend through the most mountainous sections of the Rockies.

Entry is limited to twenty cars, and entrance requirements have been made stringent for this reason. Each contestant must furnish a cash bond of \$100 to bind his entry, and other restrictions are to be announced later. Several entries have been received and tentatively accepted. There in all probability will be more applicants than places.

This is the proposed routing:

First day—San Francisco to Truckee.
Second day—Truckee to Tonopah, Nev., via Reno.
Third day—Tonopah to Ely.
Fourth day—Ely to Fish Springs, Utah.
Fifth day—Fish Springs to Salt Lake City.
Sixth day—Salt Lake City to Grand Junction, Colo.
Seventh day—Grand Junction to Glenwood Springs.
Eighth day—Glenwood Springs to Salida via Buena Vista and Leadville.
Ninth day—Salida to Syracuse, Kan., via Pueblo.
Tenth day—Syracuse to Hutchinson.
Eleventh day—Hutchinson to Kansas City.
Twelfth day—Kansas City to Columbia, Mo.
Thirteenth day—Columbia to St. Louis.

SAYS POET-LARIAT MORRIS

Seattle has a semi-official poet who sells Moon cars. He not only sells Moon cars, but he writes Moon lyrics. Whether the name has anything to do with this seeming failing is unknown at present, but this particular poet likes the name. All the moon verses he writes are published under the general caption "Moonlight."

"I suppose folks have said, 'There's a full Moon,' forty-seven thousand times when they have seen the Moon touring car gliding along with seven or eight passengers and the family dog abroad," says Morris. "It seems to be an irresistible impulse inhumanity to make puns, so what's the use to worry. I guess Mr. Moon can

stand it, and I think it helps the Moon car along.'"

COULDN'T FOOL THE HORSE

"There's one thing they've all got to say about the Moon," chimes in Supt. R. L. Cleveland of the plant, "the Moon motor car never is in eclipse."

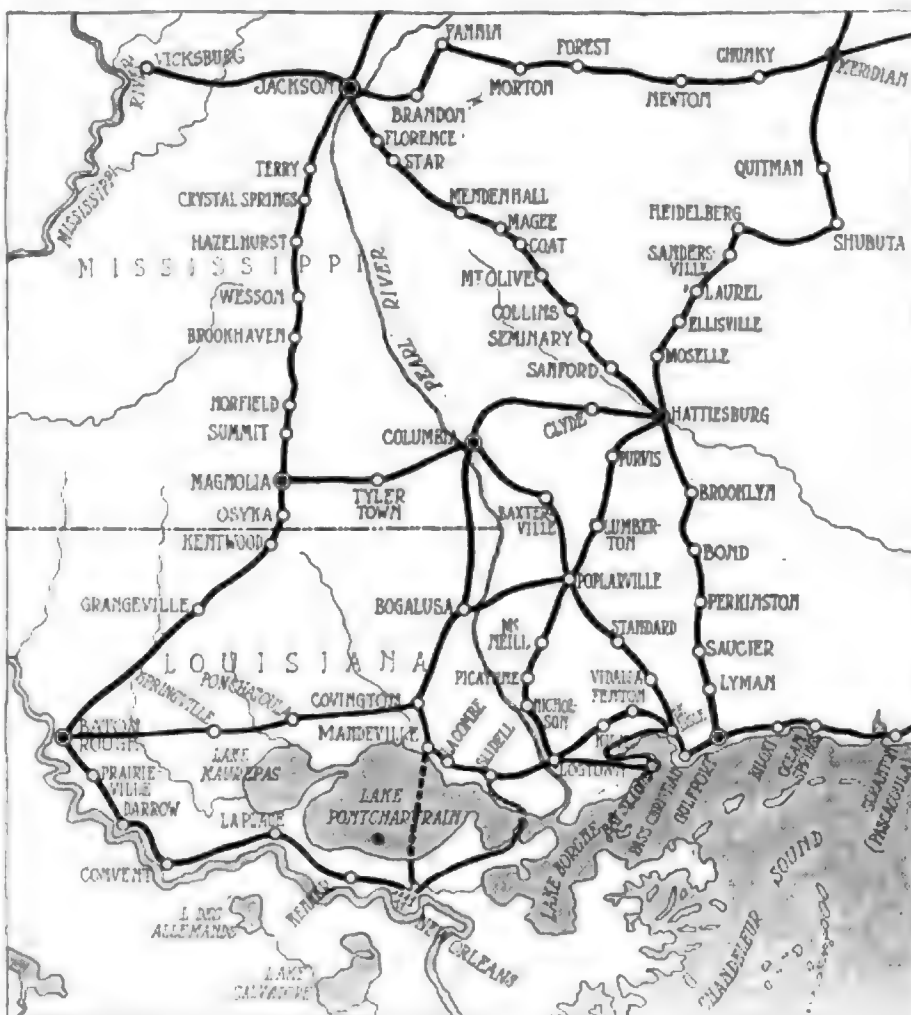
"And it shines for all," adds Poet-Lariat Morris.

M. O. Reeves, Columbus, Ind., built a motor car about the time of the first Haynes, two months later to be exact.

When he built his car he had a harder time testing it than he did building it. If he took it out on the country roads it frightened every horse that came within sight at it. But Mr. Reeves thought he could fix that.

A papier mache horse head and a bridle were his instruments of fixing. He attached the bridle to the head. He fastened the head on the front of the car. He started out.

"But it never fooled a single horse," he tells now. "All of them knew there was something unusual going on and tried to run away. My brother said he thought the main trouble was my neglect to tie a horse tail on the rear of the automobile."



Map showing roads in Flicksburg and New Orleans section

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PIKE'S PEAK HIGHWAY WORKERS

PROMISE GREATER ACTIVITY

General Manager to Endeavor to Have Entire Road
Hard-Surfaced by End of 1919

ST. JOSEPH, Mo., Feb. 14—New life was injected into the Pike's Peak Ocean-to-Ocean Highway Association; greater activities that will come only with adequate funds for pushing the work is the goal set for 1917; both being results of the fourth annual convention of the association which closed a two-day session here to-night. Out of the throes of inactivity into an active campaign for a transcontinental highway that will be a credit to the name it bears is the thought engendered at the meeting yesterday and to-day. Every phase in the fundamental building of a great transcontinental highway was gone into thoroughly. The coming year will see the road with a general manager, a field man whose duty it will be to traverse the road continually and stir up enthusiasm among the residents along the road to the end that the road may be hard-surfaced from coast to coast before the end of 1919.

Expense Is Very Low

It must be admitted that the administration expense attached to the Pike's Peak highway stands by itself so far as any transcontinental route is concerned not at the highest point, but at the lowest. One can understand why new life, wider activities, greater aggression is apropos in connection with this highway body when he is told that the total expense of the national

By William K. Gibbs

body in the three years it has been in existence is approximately \$1,300. Especially was the insignificance of this amount brought home to the delegation at the meeting when George E. McIninch, Missouri director of the Jefferson Highway Association, told them that the Jefferson highway, during its short existence, had expended something over \$12,000 and still had several thousands of dollars on hand.

**The Work for the
Coming Year**

Each state through which the highway passes will be assessed \$1,000 to provide greater administrative funds.

Memberships ranging from \$1 to \$1,000 will be sold to bring the financial condition of the association up more nearly on the plane of other similar road organizations.

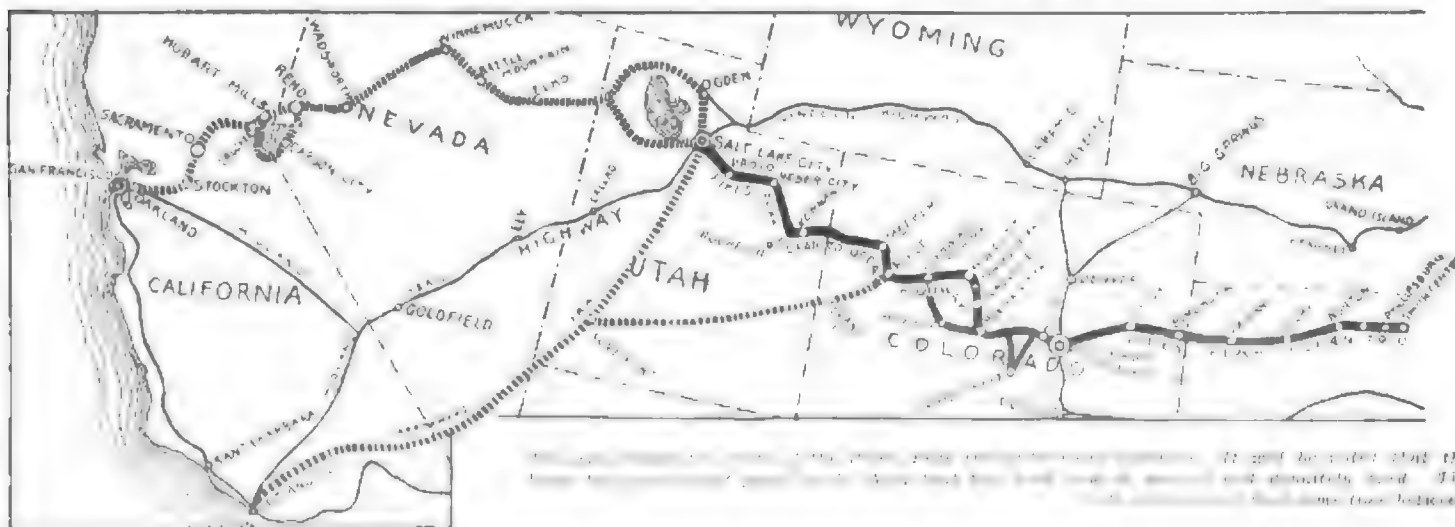
A sociability run from East to the West will be run next summer and a summer meeting of the association will be held on the summit of Pike's Peak.

Further, the Lincoln highway expended in administration last year approximately \$31,000. Both of these latter roads have field men and general managers who keep interest alive in the projects and thus the additional funds expended make for a higher degree of efficiency of these two highways.

Fortunately for the Pike's Peak highway, most of the states through which it passes either have state highway commissions, or are at the present time passing laws creating such commissions. Colorado, Kansas, Missouri, Illinois and Indiana Legislatures were acting upon such measures during the course of the convention and it was reported that the measures were practically certain of passage.

Conceptions of Highway

Many spirited addresses were made in which every effort was made to give the conception of what a highway means. A highway no longer is simply a track upon which to make short trips about the community; it is the link that connects civilization. One speaker voiced the statement that there never would have been a civil war, possibly not even state divisions, had the means of transportation and intercommunication been all that they should so that the people of one community had ready access to the people of another. The great highway movements of to-day may



be likened to the pioneer work of the railroads a half-century ago. It seems probable that the railroads' day of further expansion is ebbing; hence it is necessary that a new avenue of inter-communication must be developed, for the railroads cannot cope with the situation and come out 100 per cent efficient now; surely they cannot in the future when their earning power now is said to be insufficient to meet the demands made upon them.

The opinion was generally expressed that hard roads should be the goal and that much more benefit would accrue from expending money for hard-surfacing roads than for grading and filling. No longer is it necessary that a road be level; in fact, the undulating road has a charm that the level road does not. One Missourian volunteered to pay \$1 per front foot toward building a concrete or brick road past his place. His farm has a frontage of one mile along the Pike's Peak Ocean-to-Ocean highway and he declared that for every dollar he gave for hard roads he firmly believed the value of his land would become enhanced many times. He pointed out that if the city lot owner can afford to pay an assessment of \$40 or \$50 on his 50 by 150-ft. lot for street improvement, the farmer can well afford to pay a dollar per front foot.

Board of Directors to Manage

Henceforth the management of the road will be in the hands of a board of directors, which consists of the national officers and delegates from each state section, this move being made possible through a change in the constitution and by-laws. Any questions that require immediate attention will be put to a referendum vote by mail the same as members of the Chamber of Commerce of the United States of America vote on questions that require their sanction and which cannot wait until all are called together. A time limit is put on the vote and the majority of the votes received up to a certain time shall constitute the action of the whole board of directors.

Commendatory telegrams were sent to the presiding officers of both houses of

the Legislatures of Colorado, Kansas, Missouri, Illinois and Indiana, because the measures now being acted upon and which presage much highway activity during this year and in the future are so closely in harmony, creating authoritative, responsible commissions, centralized power and flexible administration as well as rightly based engineering.

History may be said to place its stamp of approval on the Pike's Peak highway as a logical transcontinental trail. Through Ohio to Indianapolis it follows the Old Cumberland trail, built by the government in 1806 at a cost of over \$7,000,000. It passes the home of Abraham Lincoln in Illinois, thence west through Hannibal, Mo., the birth-place of Mark Twain, paralleling the first railroad ever constructed across Missouri and following an historic trail. It passes through St. Joseph where the old pony express was inaugurated for the frontier, and where outfitting was done in the "Pike's Peak or Bust," days. It passes through Belleville, Kan., near the site of the peace conference between Lieut. Zebulon Montgomery Pike and the Pawnee Indians in 1896 and heads toward Pike's Peak, the goal of the pioneer and the mecca of the tourist. Entering the mountains it follows the old trail used by

the Ute Indians and passes through Colorado to Utah. It is the modern development of trails blazed by the explorer.

Let us look for a moment at the condition of the Pike's Peak highway through various states. Of Missouri's 209 miles 23 miles are hard surfaced and the balance are graded dirt. Illinois has 250 miles and practically all of it is graded dirt. Indiana has 200 miles and enjoys the distinction, perhaps, of having the most mileage of good gravelled highway of any state on the line. Ohio's part measures 250 miles, most of which is hard-surfaced. Pennsylvania has 300 miles and most of it is in good condition. West of here comes Kansas with its 480 miles across the plains. This road has been materially improved in the last year and with the new highway laws in effect will show much improvement this year. Colorado's division of the highway measures 500 miles and while parts of it need rebuilding, much work was done in the last year and much is contemplated.

The Trip Worth While

The writer recalls a trip from Colorado Springs to Glenwood Springs last year through the heart of the Colorado Rockies that was made with ease and comfort, and work under way at that time will be largely completed by the time the touring season opens again, which should make this part of the route materially better. If one had to follow a cow path the scenery of this section would be well worth it, but the ultimate aim is a good road throughout the state and the time is coming at no distant date when good roads will be a reality in this section. Mountain road building presents a task that is unknown in the central states. There it must be blasted from solid rock, but once built, maintenance is almost nil. Utah now has 400 miles of the Pike's Peak highway, but with the western extension so largely in question it is difficult to say how much this state may have when a decision is made.

Invitations have been extended to the association to make several points on the Pacific coast the western terminus of the highway, but so far no action has been taken. F. V. Owen, secretary of the Ar-

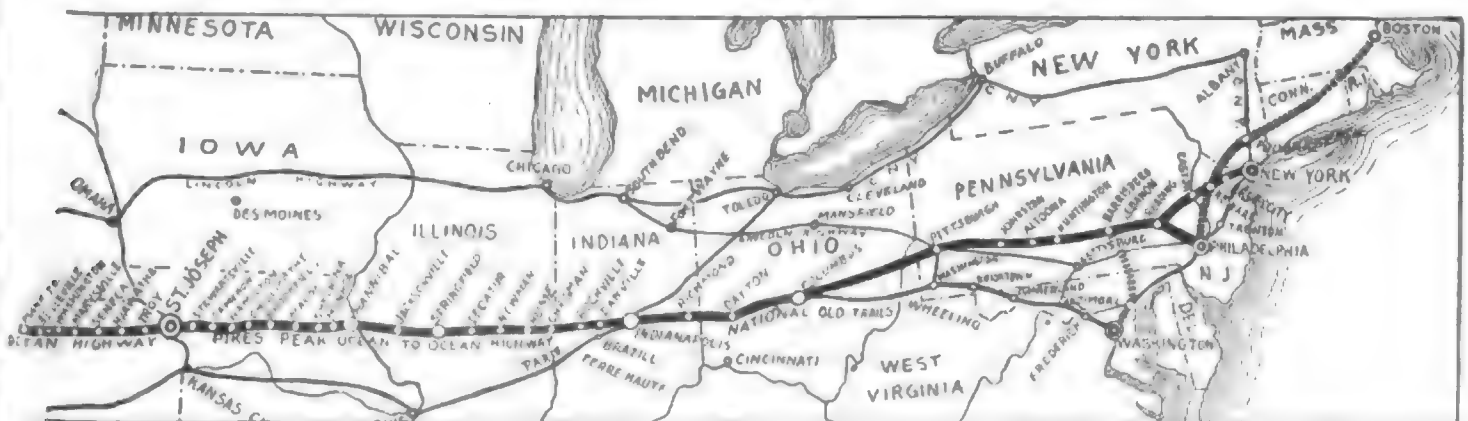
Future of the Pike's Peak Highway

Not only a good road, but the best road from coast to coast, is the only thing that will satisfy its sponsors.

A hard-surfaced road its entire length within the next three to five years.

A general manager and field secretary to give their undivided attention to the road in future, to the end that all sections are active.

Ultimately make the Pike's Peak highway a road that will be used for freight hauling as well as for touring.



route passes almost through the center of the United States from North to South. Just now the western terminus is undecided, Salt Lake City dotted lines both east and west show the several routes that have been suggested and action will be taken on these and the most logical termini on none and the date touring begins



Traffic Signals Again

DIRECTION SIGNAL CRITICISED

Liability of Driver to Give Wrong Indication Is Cited

EDITOR MOTOR AGE—We have just sent out to 260 chiefs of police, in fact every town in the U. S. over 25,000 inhabitants, the following letter, drawing their attention to the discussion of traffic signals, just started in *MOTOR AGE*.

We are quite ready to admit that the direction type of signal is ideal, for it is always nice to know just what the other fellow is going to do, but repeated tests have brought out the weak point, that is, people will persist in giving the wrong signal.

"The city of St. Louis has just been busy in passing a new traffic ordinance and in the nature of things has stirred up such comment and criticism, as is evidenced by an article in *MOTOR AGE* Jan. 18.

"As Mr. Ash, the writer, says, the time is ripe for signals on motor cars, but before many cities adopt ordinances in regard to signals, he thinks, and we agree, that a nation-wide discussion of the subject should be made and suggests to *MOTOR AGE* that they keep their columns open for such discussion, so that the best type of signal shall be made standard, and so that the manufacturers may conform to this standard.

Direction Signals Dangerous

"We have answered Mr. Ash and have also brought out the details of what we consider to be the only feasible type of signal, as our experience with direction signals convinces us that they are too dangerous to be adopted, on account of the liability of drivers giving a wrong indication.

"We maintain that a warning to the driver behind is all that is necessary, and no attempt need be made to indicate which direction car will turn, as it is of no consequence to the following driver just so long as he is warned of an impending change of direction or speed. Where a signal is installed, controlled by several push buttons or lever positions, the driver is open at all times to give the wrong signal, and you will agree with us that a wrong signal is worse than none at all.

"We believe, from observation, that a traffic officer at street intersections has no time to watch for a variety of traffic signals, and he will never do it. The officer watches the face of the driver for his signal, as well as for a nod of recognition; furthermore, the driver is under the absolute control of the traffic officer and must do as he says; therefore, there is no need

for any mechanical signal, in so far as the officer is concerned, a slight hand signal being given when a turn is desired as at present.

"We maintain that a signal requiring the special education of the public to its use will fall down when the farmer and tourist comes to town. A red flag and a red light, the universal warning and danger signal, have been in use for sixty-two years on the railroads. Everyone knows them. You have known their meaning since you wore short breeches.

"We take this occasion to draw your attention to the discussion of the subject in *MOTOR AGE*."—Edwin H. Roberts, manager, Denver Traffic Signal & Mfg. Co., Denver, Colo.

2.9 M.P.H. ON HIGH

Los Angeles, Feb. 16—To ascertain how slow a Saxon Six touring car can be operated for a protracted period in high gear, a test was made by the J. V. Baldwin Co. of this city on Ascot speedway. The standard gear ratio of 4¾ to 1 on high was used. The shifting lever was removed, and after being officially inspected the car was sent on its way around the mile track. In the 24 hrs. that the car was run it covered only 68 miles, an average of 2.9 m.p.h. The top was removed, but otherwise the car carried complete equipment, including the starting device.

KING TAKES CLIMB TROPHY

San Francisco, Cal., Feb. 17—By climbing the 10-mile Mount Diablo grade on high gear during the San Francisco show a King eight cylinder touring car was awarded the Oakland Tribune High Gear Challenge Trophy.

GOVERNMENT-OWNED TRUCKS

Washington, D. C., Feb. 19—In eight large cities the United States postoffice operates 539 motor trucks in postal work, the installation of these vehicles having followed a thorough investigation by a committee of three experts in Chicago, Minneapolis and New York.

Previously the government had hired its transportation done by local teaming concerns on contracts usually covering about 4 years. These contractors by employing motor trucks so improved the service, economizing in cost at the same time, that it was determined, if feasible, to motorize the service in several prominent cities

and to have such motorization under government ownership to insure consistent and reliable service at a minimum cost.

The trucks are used for parcel post delivery and collection, inter-station work and transfer of mail between the postoffices and railway stations. They range in capacity from 750 lbs. to 3¼ tons, representing eight makes of chassis.

The greatest number is in Chicago, that city having 228. Fords lead, there being 312 of these in the eight cities, of which number seventy-six have Olsen converters to raise their capacity to ½-ton. The largest single fleet of one make consists of 100 un-converted Fords used in Chicago. Following is a tabular summary of the installations:

Cities	Number
Chicago	228
Philadelphia	122
St. Louis	56
Detroit	49
Pittsburgh	48
Washington	19
Indianapolis	9
Nashville	8

FORD OPERATES ON KEROSENE.

Chicago, Feb. 16—That the modern motor car can be operated upon kerosene or similar low-grade fuels without radical change in the engine and by the employment of the conventional gasoline carburetor, providing the fuel is sufficiently heated, was demonstrated to a representative of *MOTOR AGE* yesterday. A stock Ford car with the stock carburetor was employed, the only change being the addition of a chamber into which the kerosene was led and in which it could be heated by the exhaust gas. The device used is called the G. P. system and is made by the G. P. Coal Oil System, Chicago. The only other change was in the use of a slightly thicker gasket under the cylinder head so the compression is lowered and a two-way cock so gasoline could be turned on for starting and kerosene for running.

In a two hours' run on kerosene the car performed in every respect as well as other Ford cars on gasoline and better than most. There was not a suggestion of smoke at any time except once when the throttle was quickly closed after the engine had been raced. There was no tendency to heat up and no tendency to sluggishness. The day was quite cold, but carburetion seemed perfect. No missing was noticed and when a handkerchief was held up to the exhaust pipe for a few seconds there was no discoloration of the linen—a pretty good evidence of perfect carburetion.

Clarify Federal Road Aid

Bill Not Designed for Improvement of Entire Rural Routes, Says Author

Believed That Interpretation Would Defeat Purpose of the Act

ATLANTA, Ga., Feb. 16—That the United States department of justice will not interpret the act appropriating \$85,000,000 for aid of states in the construction of highways to mean that this sum must be spent for the improvement of the entirety of any rural route, of which a state may plan the improvement of a part, is the view entertained by United States Senator John H. Bankhead of Alabama, author of the act.

The postoffice department has asked the department of justice for a construction of the law which would require the improvement of the entire mileage of a rural mail route whenever a state selects a portion of such a route for improvement. The result of this would be the improvement of a number of loop highways running a few miles out of a town and back in again.

Intent of Act Explained

Senator Bankhead, in an address before a meeting of the Bankhead Highway Association, which has been held in Atlanta, declared that any such view of the act is erroneous and would fail to carry out the intent of the act. He declared that this point was the subject of thorough debate on the floor of the senate before the bill was passed and that the bill was passed with the certain understanding that the usefulness of it should not be destroyed in this manner. The senator interpreted the intent of the act to be that portions of the federal fund going to the several states should be used by these states, under the provisions set forth in the act, for the improvement of any road used or that might probably be used in the future as a rural mail route, that it did not contemplate that thousands of dollars should be spent in improving such parts of rural routes as are infrequently traversed by traffic except, perhaps, by the rural route mail carrier himself.

Further, the senator is of the opinion that this appropriation of \$85,000,000 to be distributed over a five-year period is but the beginning of federal aid for highway improvement. He stated that it is his belief that, before the five year period has expired, Congress will be appropriating from \$50,000,000 to \$75,000,000 for the improvement of public roads.

BANKHEAD HIGHWAY EXTENSION

Atlanta, Ga., Feb. 16—At a conference of the Bankhead Highway Association, just closed here, plans were made for the extension of that highway from Atlanta to Washington, D. C.

At a meeting to be held in Greensboro, N. C., in March, divisional associations will be organized for the Carolinas and Virginia for carrying out the construction of the new extension of the highway. Divisional associations already have been organized in Georgia, Alabama and Tennessee. In March also a meeting will be held at Memphis, Tenn., when divisional organizations will be perfected for all states which will be traversed by the Bankhead highway west of the Mississippi river to Los Angeles, Cal.

A meeting of the national organization has been called in Birmingham, Ala., April 19, when plans will be made for locating the route of the highway and other details of reorganization and construction considered.

At the Birmingham meeting will be governors and leading road builders of many states. The governors of South Carolina, Georgia, Alabama, Arkansas and Oklahoma have already notified J. A. Bountree, Birmingham, Ala., secretary of the Bankhead Highway Association, of their intention of attending the Birmingham meeting. When completed the Bankhead highway will be the longest highway in the world, having a total lineal mileage of some 10,000 miles.

FRENCH CAR TAX DOUBLED

Paris, France, Feb. 1—With the year 1917 all car taxes in France are doubled, this being one of the special measures to provide funds for the financing of the war. Horse vehicles of all kinds are also eligible for double taxes. Before this measure came into force there was a fairly brisk demand for touring cars and as the home factories are not producing and there is a 70 per cent duty on imports, second-hand cars brought good prices. The result of the new taxation scheme has been to throw hundreds of cars on the market, and there are now more motor cars than purchasers. Doubtless the pinch of war is responsible in a certain measure for this influx of cars on to the second-hand market, for many owners who had placed their cars in storage find themselves obliged to sell owing to their shortened means and the fact that peace does not appear to be within sight. Before the war the annual taxes on a modest 8 hp. car was \$36; now they are \$72. There is no shortage of gasoline in France and no restrictions on its use, but as the price is now 53 cents a gal. it is not used recklessly by private motorists.

SIGN POSTS ON N. O. T.

Los Angeles, Cal., Feb. 16—Complete resigning of the National Old trails transcontinental highway from Los Angeles to Kansas City is to be undertaken by the Automobile Club of Southern California. A club crew will start eastward the latter part of this month, charting the trail and surveying locations for new sign posts.

No Racers from Europe

Contrary to Impression Here Foreign Countries Have Few Speed Creations

General Conditions of Manufacture Abroad Outlined and Described

PARIS, France, Feb. 5—There appears to be an impression in America that Europe can still provide a few racing cars. The fact is that all the European factories have been swept clean of all their speed creations and have had no opportunities of making new ones since the outbreak of war. In August, 1914, successful racing cars were to be found in the Peugeot, Delage, Sunbeam, Mercedes, Fiat, Opel, and Nagan factories. Vauxhall had a set of cars which might have become successful if six months more work had been put into them. All the Peugeots have been shipped to America, and the Peugeot factory is incapable of producing any more machines for its race team has been broken up, its race engineer having formed an independent company to manufacture aviation engines. Boillot has been killed and Jules Goux is a lieutenant in the French army.

Delage has also sold all his cars, with the exception of Guyot's machine which finished third at Indianapolis in 1914. This has been converted into a fast runabout, for its cylinder capacity exceeds the 300-in. limit. Delage has maintained his complete organization, but is too busy on army work to produce racing machines. Sunbeam made a new motor for the 1914 Grand Prix racers and sent one to America last year, but it is understood no more have been built.

Mercedes Cannot Ship

Mercedes possesses the most successful racing cars, but unless the British fleet can be put to sleep they will not reach America until after the war. It is known that several persons have tried to get the machines out of Germany, but have had to abandon the attempt. The Opel cars are less interesting, but they also are unavailable by reason of the blockade. Fiat has two of the last French Grand Prix cars, and it is likely that they will reach America in the spring in order to race for the new American Fiat Co., now controlled by the parent factory. These are the only available cars, and they are not for sale. The 300-hp. Fiat is at the Turin factory, where it has been lying since Arthur Duray made his attempt on the world's kilometer record. The car, however, is privately owned and does not appear to be for sale. Also its dimensions put it out of competitive racing. The Nagan factory is in Belgium and only the Germans know what has become of the set of 1914 racing cars run at Lyons.

Although there are no racing machines available now, indications are that they

will be produced on the declaration of peace. All the motor car factories have secured a strong financial position and have had wonderful experience on aviation engines. Engineer Henry, who was responsible for the Peugeot engines, states that since he took up aviation engine design and construction he has learned more than he ever considered it possible for a man to learn. Other firms have acquired valuable experience and will be anxious to show their worth by producing special racing creations. In a few cases drawings have been prepared, but of course no constructive work has been done.

MAY LIMIT TRUCK LOADS

Lansing, Mich., Feb. 16—A tentative law has been drawn up by the truck general department, the senate and house roads committees and the state highway department, which, if enacted, will not affect any wagon or motor truck now in use in the state but will prevent overloading of all hereafter.

Shippers and manufacturers in each state have been using heavy trucks for hauls overland and have cut up many roads which were built for exceptionally heavy loads but not for gross weights of 18 or 20 tons. The new law would prohibit the operation of any vehicle the gross weight of which exceeds 15 tons, farm implements and road construction machinery excepted. Nor will it allow the operation of any vehicle which has a gross weight per inch width of tire exceeding 600 lb.

Would Bar Metal Wheel Usually

Metal drive-wheels which come in contact with the road would be barred on all motor truck or trailers operating in the roads, except where chains and non-skidding devices are used. No motor truck or trailer could have a gage of more than 75 in., from center of tire to center of tire, and usually not be more than 96 in. wide over all or more than 12 ft. 6 in. high.

The law also includes an act providing for speed of trucks and trailers figured on tire widths and ranging from 20 m.p.h. for 2-in. tires down to 12 m.p.h. for 7-in. tires. On the basis of the maximum wheel-load in pounds, a 1400-lb. load can travel 18 m.p.h., while one weighing 6400 lbs. can go but 10 m.p.h.

All trucks and trailers now operating are to carry conspicuously the information relative to their height of wheel, width of tire, gage, width over all and carrying capacity.

Three-quarters of the gross weight permitted a truck or trailer is to be carried on the rear axle. Trucks and trailers used as buses are controlled by this act. In the case of a truck carrying a trailer, the speed would be governed by the vehicle having the lowest mile an hour rating.

During March, April and May the carrying capacity would be limited to one half the carrying capacity in the law. Penalties are provided for violations.

Inter-City Match Dates

Contest Board Selects July 17-19 for Reliability Run Out of Buffalo

Ten Teams Only Will Be Permitted to Enter

NEW YORK, Feb. 17—Dates for the proposed inter-city team reliability match were selected to-day at a meeting held in the office of the Contest Board of the American Automobile Association, participated in by Chairman Kennerdell of the A. A. A. Contest Board, Robert Lee Morrell, head of the Metropolitan Consulate, A. A. A.; Samuel E. Hibben of Chicago, chairman of the Inter-City committee and C. G. Sinsabaugh, secretary. The dates chosen were July 17, 18 and 19, and it was decided to use Buffalo as the start and finish of the match, the Automobile Club of Buffalo having undertaken to act as host and to lay out the routes and make all hotel arrangements.

Teams Are Limited

It was decided at the meeting to limit the entry to teams from ten cities, each team to consist of from five to ten cars each. So far definite assurances of support have been received from New York, Chicago, Indianapolis, Ind., Detroit, Buffalo, N. Y., while Philadelphia, Pa., Boston, Mass., and Cleveland, Ohio, are considering the matter so it will be seen that it will be comparatively easy to fill the entry lists. Each city must declare by May 1 its intention to compete and must announce the make-up of its team by June 1. The complete rules, which will be essentially the regulations which have governed the Chicago Inter-Club team matches for the last ten years, will be framed by a committee headed by George F. Ballou, formerly of Chicago and now of New York. These will be ready by March 1, at which time entry blanks will be sent out.

Each city will be entitled to representation on the general committee, which will make the appointment and hold each representative responsible for the make-up of the team in his city. At the present time these representatives are: Chicago, S. E. Hibben; New York, Robert Lee Morrell; Indianapolis, Ind., H. H. Rice; Buffalo, N. Y., Dai H. Lewis; Detroit, W. S. Gilbreath. In all probability Harry W. Knights will look after the Boston, Mass., team, S. Boyer Davis, Philadelphia, Pa., and Fred H. Caley, Cleveland, Ohio.

TAXI RATES BY YARD

Paris, France, Jan. 29—In consequence of the general increased cost of all commodities, Paris taxicab drivers have been given permission to raise their rates. Withing twenty-four hours of the police authority being issued practically all the taxicab companies had boosted their prices. These

increased charges are exceptional and are only for the length of the war. The initial charge of fifteen cents remains unchanged, but the distance carried for that amount has been decreased. Thus, instead of running a distance of 984 yards for fifteen cents, the meter now rings up an extra two cents at the end of 820 yards, then two cents more every 273 yards instead of every 328 yards, as formerly. Horse cabs increased their rates in the same way and in the same proportion.

GERMAN TRUCKS CHANGED

New York, Feb. 17—Recent advices from Germany indicate the effect of the war has been marked in the design of German commercial vehicles. The trend has been toward American ideals of construction rather than the German, since German designs have been found too rigid for successful negotiation of rough roads; clearances were too low for new roads; and the vehicles were too heavy and their wheelbases often too long for a short enough turning radius.

The Germans recently have had an opportunity to study American design in the Yarrowdale, which the Germans captured. It contained American trucks consigned to the Allies. From their description as of the Bull-dog type it is inferred that they were Kelly-Springfields. They are being used in Berlin for carrying coal.

Hansa-Lloyd at Bremen now is producing a standard truck design which in both appearance and construction resembles American practice. These trucks are of 2-ton capacity, have shorter wheelbases, higher wheels and considerably more clearance.

EMPLOYEES TAKE 126 TIRES

Memphis, Tenn., Feb. 17—To lose \$2,500 worth of tires in several months without knowing it was the unusual experience of the 638 Tire & Vulcanizing Co. of this city. Five negro service chauffeurs employed by the company succeeded in taking 126 tires from the shop before being caught. The thefts were uncovered when detectives found some tires which they learned were stolen in the shop of a dealer in supplies. The make and serial numbers showed they came from the tire company's place and an investigation followed. Two grocers were arrested on the charge of receiving stolen goods, when it was learned that they had bought tires from the drivers and had resold them. Both denied knowing they were stolen. Later, the detectives, while working on the case, observed a car that had run into the curb. Investigating, they found one of the stolen tires on the wheel. The machine was a taxicab and the owner of the company was arrested.

The drivers, it is said by the detectives, operated on the order first principle and did not steal any tires until they had found a market.





Cloud Payments on Cloud Paycom

How to Set Up Payments on Cloud Paycom

By [David S. Allen](#) and [David S. Allen](#)





Packard Selling Race

Trade Sweepstakes Will Start on Washington's Birthday at Factory

Sales to Be Listed on Lincoln Highway Map

DETROIT, Feb. 20—At 11 a. m. this morning 111 Packard dealers and their employees opened sealed orders telling them of a selling sweepstakes race starting Washington's Birthday at noon. The dealers have been divided into four classes, and each class runs an independent race, which will last until 2500 cars are sold. The 2500 cars have been divided into allotments graduated in size, depending on the number of cars sold so far this selling season. The selling season for the Packard company starts in August, and hence the number is based on past records from August to date.

When the race closes the dealer in each class who has sold the highest percentage of his allotment wins and will receive a prize. Of the dealers 110 are in the United States and one in Honolulu. The score is to be kept on boards carrying a map of the Lincoln highway. The distance across the continent is divided into 100 spaces, each space representing 1 per cent of quota. The racers start at San Francisco and when they have reached New York 100 per cent of quota has been sold. For those who exceed 100 per cent quota imaginary vessels will bear them out to sea on the scoreboard.

The race involves more than 800 salesmen and is expected to extend to every man in the organization in one form or other. Its purpose is a test of the Packard sales organization and to measure its efficiency in merchandising. A program will be given at the Packard factory Washington's Birthday, and President McAuley will start the race by pushing a button. It is expected that there will be contests between salesmen in each organization.

ATLANTA SPACE IN DEMAND

Atlanta, Ga., Feb. 20—Special telegram—With every inch of available space already contracted for and many new exhibitors clamoring for booths the Southeastern Automobile Show will open here Saturday, Feb. 24, to continue for eight days at the Auditorium Building. The display will cover 28,000 sq. ft.

STUTZ PROFITS MOUNT

Indianapolis, Ind., Feb. 16—Net profits of \$649,042 for the year ended Dec. 31, 1916, are reported by the Stutz Motor Co., this city. These are equal to \$3.65 a share on the 75,000 shares of stock, no par value, of the parent company, the Stutz Motor

Car Co. of America, which took over the local company last June.

The income account for the 7 months ended Dec. 31, shows net profits for the period of \$381,061, equivalent to \$5.08 a share. In that period \$1,771,328 in cars were sold. During the whole year the company produced 1535 cars, an increase of 42 per cent over 1915. The entire expected maximum output of cars for 1917 has been contracted for.

WIDENING RIVER FOR FORD

Detroit, Feb. 16 — Appropriation for making the River Rouge navigable to the Henry Ford blast furnaces will come before the senate committee next week. Contingent on this appropriation are contracts of approximately \$12,000,000. If the appropriation does not go through, it will be impossible to get ore to the gigantic industry planned by the Ford Motor Co. The project for making the Rouge navigable for the largest lake boats from its mouth to the Ford furnaces appropriation is possible in the opinion of those in charge of the lake survey.

DOBLE DISTRIBUTORS ANNOUNCED

Detroit, Feb. 17—The General Engineering Co., this city, maker of the Doble steam car, has appointed the Pacific Kiesel Kar Co., San Francisco, Cal., distributor of the Doble on the Pacific Coast and the E. C. Thompson Co., Minneapolis, Minn., distributor in the central northwest. The San Francisco company has been allotted the states of California, Oregon, Washington, Nevada, Arizona and Hawaii. The Thompson company will have Minnesota, the western half of Wisconsin, North and South Dakota and all Montana east of the Rockies.

TRUCK BUSINESS DOUBLED

Detroit, Feb. 19—The Detroit-Wyandotte Motor Truck Co. held its annual meeting last week and announced that the volume of business handled by the company in 1916 was approximately double that of the year preceding. The financial statement shows a net surplus of \$80,438.99 at the end of the year. The following officers were re-elected: President and general manager, George A. Horner; vice-president, D. Rasch; secretary and treasurer, Milo O. Crawford.

MAY MAKE WAR BALLOONS

Akron, Ohio, Feb. 19—The B. F. Goodrich Co. and the Goodyear Tire & Rubber Co. are preparing bids for the manufacture of several hundred airships of the non rigid Blimp type, to be used by the Federal Government for scout duty along the coast. These air devices will be about 150 ft. long and of cigar shape, resembling somewhat the zeppelin with the expansion of the power equipment and general construction.

Dodge to Build Truck

Proposed Light Delivery Car May Not Exceed 1000 Pounds

Design Will Be Tested Thoroughly Before Its Production

DETROIT, Feb. 16—Dodge Bros. will bring out a small truck. Reports have been circulated that the Dodge company already has brought out a commercial vehicle. These reports are untrue, though the Dodge company has under consideration the manufacture of a light delivery car which will probably not exceed 1000-lb. capacity.

An official of the Dodge company explained that there had been urgent requests from the dealers for a small truck, and it is to meet this demand that preliminary designs for a small unit are now being formulated. Before the truck is actually built, however, a few will be made up and given an exhaustive road test so that when the design is perfected, production will be uninterrupted by errors which might have occurred due to haste.

The Dodge company has discouraged the overloading of their chassis with truck bodies that are too heavy, but to meet the requirements where it has been absolutely necessary, a few chassis have been furnished which are the same as the stock passenger cars except for oversized tires, heavier springs and a special form of shroud which is flush with the windshield.

REDDEN IN BIG PRODUCTION

Chicago, Feb. 16—Quantity production of the Redden Truck-Maker, backed by \$3,000,000 capital, is the basis of the big merchandising plan of the Redden Truck Co., which has just completed its organization. A coterie of Chicago and New York banking and manufacturing interests have arranged to re-finance the company and place it in a position to make the truck-converting attachments complete in plants that will be allied with the Redden company.

Twenty branch assembly plants in twenty of the largest cities in the country are part of the manufacturing and merchandising plan of the company. The main factory of the enterprise will be located either at Joliet, Ill., Jackson, Mich., or Chicago, where those people interested already have large manufacturing interests. Subsidiary plants will be operated after the plan of the Ford Motor Co.

Prominent in the organization of the Redden company are the following: Horace DeLisser of the Ajax Rubber Co.; H. W. Cowan, capitalist and former associate of F. W. Woolworth; C. A. Bickett, president of the Chicago Bearing Metal Co.; L. B. Patterson, Chicago banker; and W. K. Pritchitt, of the New York banking house, Pritchitt & Co.

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Figure 1: The University of North Carolina at Chapel Hill





LOUISVILLE AS A USER

RANKS WITH LEADERS AS MOTOR CAR CITY, IN USE AND DISTRIBUTION

LOUISVILLE, Ky., Feb. 16—Louisville's annual show is the largest to hold attention south of the Ohio river and marks the opening of the selling season in this section of the country. The territory covered by the local agents, factory representatives and branches, as a rule, includes southern Indiana, the entire state of Kentucky and in some instances Tennessee, the western portions of West Virginia and Virginia.

In Louisville sixty-six different makes of cars are handled by fifty-one dealers and distributors. A number of the largest factories and tire concerns in the United States maintain branches here.

Distribution Facilities of Best

Louisville is a motor car city, not in the producing sense, but from the standpoint of use and distribution. As a distributing point, with its excellent railroad and river facilities, it ranks with the leaders.

Business is far better than it was at this time last year. A conservative estimate, based on interview with dealers, shows an increase of about 50 per cent so far this year over the same period in 1916. A few agents declare business is 75 per cent better, but this is the exception rather than the rule.

The majority of the dealers have a larger list of live prospects, who have promised to sign up in the spring, than ever before. The lack of deliveries is the principal complaint Kentucky dealers have to make against the factories.

Here in the Bluegrass State the truck is fast coming into its own. Never were business men so interested in the commercial car. The motor car in Kentucky experienced its most prosperous year in 1916. The actual increase in registration was 12,000 for the year.

"If 10 per cent of the cars registered in 1915 were consigned to the junk pile or taken outside of the state the sales of new cars reached the total of 14,000, or an increase of 71 per cent," says Hugh Ramsey, deputy commissioner of motor vehicles, who is an authority on the Kentucky motor vehicle situation.

Most New Cars Low Priced

Of these 14,000 new cars about 80 per cent were cars priced under \$1,000, many of them under \$500. The 20 per cent represented by the higher-priced cars will bring the average price to about \$700 per car, or about \$10,000,000 worth of new cars were purchased in the state in 1916. The total state registration for 1916 was 31,500 cars and 1590 motorcycles, which paid \$181,174.94 in fees. The entire receipts are turned over to the state road fund, less the

Show Opens Season

expenses of the department. This adds about one-third to the collections from the state road tax of 5 cents per \$100, all of which is distributed to the counties by the state highway department.

This is every indication that the collections for 1917 will run to \$275,000, as the same proportion of increase would give a total of 50,000 cars. Receipts will be greater this year than heretofore for the same number of cars.

How Use Has Grown

To give an idea of the growth of the motor car in Kentucky, the car and truck registrations by years since 1911 are given herewith:

1911	2,808	1914	11,746
1912	5,147	1915	19,500
1913	7,210	1916	31,500

A tabulation of the licenses issued during three months of 1916, when practically all the registrations applied to new cars, show that the six best sellers had as a leader a car selling under \$500, which was registering 57 per cent of the total number. Number two was a car selling at about \$700, with 5½ per cent. Number three sold at about \$600, with 4 per cent. Number four sold at near \$1,000, with 3¾ per cent. Number five was at about \$500, with 2½ per cent, while number six sold at about \$800, with 2 per cent.

This shows that the increase has been largely the small car, and it has gone not only into the country, but the cities have taken their proportion. The sale of a small car this year means the sale of a bigger one next. In the autumn of 1915 six men came from Henry county to Frankfort together to get licenses for their new cars of a small type. In 1916 four of these men returned together for license for as many large cars. This is a general tendency.

Large Exporting Center

The estimated population of metropolitan Louisville today is 325,000; within a 20-mile radius, 400,000. The city is the largest exporting center in the world for tobacco and whiskies. It is the largest grain market in the country outside of Chicago, as well as the largest livestock market. Louisville also is the principal mahogany market and manufacturing center in America. Other great industries here are: Agricultural implements, porcelain-lined bath tubs, paints, varnishes, cement, chewing gum, cottonseed oil, cottonseed oil products, organs, hardware, boxes, barrels, stoves, millinery, window shades and loose-leaf ledger supplies.

Louisville's trade rounded out the year 1916 in better condition than for many years. Many manufacturers and jobbers reported the best business in their history with good prospects for the New Year. Increases of 25 to 50 per cent in the volume of business as compared with 1915 were common. Holiday trade ran from 40 to 50 per cent ahead of a year ago. Totalling nearly \$1,000,000,000, an increase approximately of \$200,000,000 over 1915, the previous best mark, bank clearings in Louisville for the last year reached the highest figure in the city's history.

The exact amount was \$942,143,136, while that of the preceding year was \$742,391,281. Increased volume of local business, reflecting also the marked revival in trade and industry in the state and the South, formed the bulk of the increase, though to some extent the rise is traceable to the fact that country bank exchanges, which are now cleared in Louisville, were greater last year than usual.

With the exception of 1914, when there was a decrease of nearly \$50,000,000, Louisville clearings have steadily increased since 1908, the year following the panic. Louisville's progress has been rapid and substantial, and today the city's exchanges are in greater volume than a number of other cities of equal size or larger, including Indianapolis, Buffalo, St. Paul, Seattle, Denver, Providence, Columbus and Toledo.

Ratio of Cars

Kentucky, with a gross area of 40,598 square miles, had a population of 2,386,866 on Jan. 1, 1917, according to the census bureau's estimate. There is only one motor car for every seventy-five persons in the Bluegrass State today, which indicates what immense possibilities Kentucky holds for the sales organizations of the factories. Then, too, there is a good foundation in this territory for future business. The principal crops of Kentucky in 1916 possessed a farm value of approximately \$187,531,590, an increase of \$58,267,000 over 1915. An increase of more than \$4,000,000 in whisky tax during the calendar year 1916 over the preceding year brought the grand total of internal revenue collections for the same period to a new record in the Fifth district of Kentucky.

Whisky collections advanced from \$14,572,725.08 in 1915 to \$18,017,928.51 in 1916, an increase of \$4,144,303.43. The grand total of internal revenue collections in the district for 1915 was \$18,513,676.74, and for 1916 \$22,380,498.95, an increase of \$3,566,821.41. Whisky brought in all of this grand total for 1916 except \$4,363,469.54.

It is estimated that over \$60,000,000 has been spent in distillery and brewing property in this state. It is further estimated that the operating capital of Kentucky distilleries aggregates something like \$125,000,000. These figures to some extent give an idea of the importance of liquor making in a state famous from its earliest days for this industry.

Leaf tobacco is bringing the highest prices in more than ten years, due to the widespread and pronounced prosperity and the great European war.

According to the United States Department of Agriculture, the state of Kentucky in 1916 raised 435,600,000 lbs. of tobacco, which had an average farm value on December 1 of 12.7 cents a lb., or a total value of \$55,321,200. The crop of 1915 was estimated at 356,400,000 lbs., and the average farm value on Dec. 1, 1915, was 7.8 cents a lb., making the total value of the crop \$27,889,200. Thus it may be seen that the crop of 1916, although only 79,200,000 lbs. larger than that of 1915, had a value twice as great.

The corn crop was worth \$82,824,000, as compared with \$58,000,000 for 1915. Besides the supply of livestock and its value and minor farm products rank far above those of 1915. Thus it may be seen that this territory is in possession of a tremendous buying power, and its business pursuits are less susceptible to the effects of the great war than those of many parts of the country.

NASHVILLE SHOW A SUCCESS

Nashville, Tenn., Feb. 19.—With an attendance of more than 30,000, a large proportion of whom were live prospects, the Nashville show, which was opened Feb. 12 and closed to-night, was the most successful held by Nashville dealers. Twenty-two dealers had displays, showing twenty-eight makes, in addition to accessory concerns. The show was held in the Hippodrome, one of the largest buildings of the kind in the South. The building was elaborately decorated, the national colors predominating. Owing to the car shortage none of the dealers was enabled to make a special display, and in some instances they were compelled to use borrowed cars.

Greater interest in the cars was shown this year than ever before, according to leading dealers, and the number and character of inquiries received indicate a record-breaking spring business. Practically every dealer in middle Tennessee and many from southern Kentucky and northern Alabama were on hand and several agencies were placed by distributors. Special preference is indicated for closed cars, due to the desire for all-year motoring.

A number of unusual features were arranged, among them being Patriotic Night, when all cars were decorated with flags and a "dove of peace" was liberated, a prize being offered for the person capturing it.

SHOW IS A THOROUGHbred TWELFTH ANNUAL EXHIBITION IS HELD IN ATMOSPHERE PECULIAR TO KENTUCKY

LOUISVILLE, Ky., Feb. 17 — Louisville's motor show has come around with all the polish and finish so long a matter of legend in regard to the famous Kentucky horse shows. Though not the largest show, it possesses a certain quality that even the national shows do not have. It is the twelfth annual show and is held in the Jefferson County Armory, a one-story building with 55,000 sq. ft. of uninterrupted floor space. While held under the auspices of the Louisville Automobile Dealers' Association, local dealers not members were permitted to exhibit.

The total of cars displayed is 167. Forty-seven makers are shown; thirty-one gasoline cars; three electric cars; and thirteen gasoline trucks. There are a dozen or more accessory exhibits by local dealers.

Fourteen-foot pillars mark the aisles between the exhibits, and growing plants are placed on the low fence posts, which are part of the general scheme to make each exhibit individual. The decorations as a whole are electrical. Festoons of evergreen draped from the center of the high ceiling to the balconies carry many electric lights.

The show is a selling show. Many of the visitors have arrangements whereby they are notified when the prospect, to whom they have sent admission invitations beforehand, arrives and are ready to receive them by the time they are fairly in the building. The show was a success financially before the doors opened even. The balance last Monday was \$3,000, and the rebates to dealers will leave a balance in the treasury, which is used to improve highways and streets and so on.

HARTFORD HAS BIGGER SHOW.

Hartford, Conn., Feb. 17.—The show, which closed here to-day, had more cars than ever and was successful from a business standpoint. Sixty-one gasoline cars were displayed, besides four electric cars and one steam. Fourteen makes of trucks were among the exhibits. The decorations were very simple, and the show committee apparently had aimed to make the cars the main points of attraction. Quite a little interest was due to the use of the armory for the show. Even when the show first opened there was some fear that the state forces might require the building. Militiamen patrolled the armory day and night, and no one was permitted below the main floor.

All space was occupied. Even the company rooms at the side were filled. More closed cars than ever were exhibited.

The Ford dealers selected show time to sell cars on installment, one half down and

the balance at \$10 a week. One of the city banks financed the plan.

MILWAUKEE SPRING SHOW

Milwaukee, Wis., Feb. 16.—Milwaukee dealers again will hold a spring show late in April. This year, as before, the show will take the form of a circuit-exposition in which each member holds a special display in his salesrooms at the same time, visitors being transported from one salesroom to another free of charge by a squadron of demonstrators furnished by each exhibitor.

The third annual fall show, with the Wisconsin State Fair in West Allis, a suburb of Milwaukee, will be held Sept. 9-15. An exclusive lease has been obtained on Machinery hall, now Motor hall, which permits an exposition of almost the same size as the Auditorium, which is used for the winter show. Bart J. Ruddle, assistant secretary and manager of the dealers' association and director of all Milwaukee shows, has been appointed superintendent of motor cars by the board of state fair managers.

D. C. WOULD RETALIATE.

Washington, D. C., Feb. 16.—During the discussion of the District of Columbia appropriation bill prior to its passage many of the Senators rose in wrath against the treatment they had been receiving from Maryland in the matter of motor car licenses. The appropriation bill carries with it an annual tax of \$5 instead of the permanent license of \$2 as heretofore on all cars up to 30 hp. and an annual fee of \$10 on cars above 30 hp. In addition, owing to the wrath mentioned, it carries a provision that cars from Maryland must get an annual license hereafter unless Maryland repeals its present law under which the car owners in the District must take out Maryland license.

Senator Blair Lee of Maryland contended that Maryland has spent \$25,000,000 on its roads and it is not fair for persons either permanently or temporarily residents in the District of Columbia to use these roads without helping somewhat to pay for them. Senator Lodge of Massachusetts answered that New England has unusually good roads which in summer are filled with tourists from every state in the union and the District, but who are not compelled to pay state license fees there. Senator Reed of Missouri attacked the constables of Maryland who, he said, hover across the District line, waiting to grab any motorist who crosses into Maryland without a Maryland license tag. The House was to consider the bill later.

TRADE CONDITIONS IN ST. LOUIS

FOURTH CITY IS MERCHANDISING FIELD TO WHICH UNUSUAL PROSPERITY HAS COME

ST. LOUIS, Mo., Feb. 17—St. Louis is a merchandising city. The pleasure car dealers here expect to do 100 per cent more business in 1917 than during 1916. Truck dealers expect to do 200 per cent more. Just how many machines this will be is another question. Trade conditions offer almost boundless possibilities. It is the fourth city; 825,000 persons live in the city, 1,000,000 in the immediate trade district and 40,000,000 within 500 miles. It is the only city of size that has not had a freight embargo declared against it this winter, and this fact is attracting many large manufacturing concerns, who are establishing assembly plants and branch factories here.

A Difficult Territory

St. Louis trade territory is a difficult territory. The St. Louis territory is considered to be the eastern half of the state, southern Illinois, western Kentucky and western Tennessee. Few local dealers have less territory than that. Some control further territory. The Packard is sold in Kansas and Oklahoma from St. Louis as are the Jackson and Allen in Arkansas, while the Oakland agency here includes Arkansas, Louisiana and Mississippi. The tendency is to give even larger territory to St. Louis dealers.

As to the number of cars that are possible sales during the coming year: The state department is prepared to issue 150,000 licenses this year. It appears from recent figures that St. Louis should sell, wholesale and retail, 65,000. An ultra-conservative dealer places the coming year's business at 45,000 cars.

Figures Prove Opportunity

St. Louis is a merchandising city. Eugene Smith, secretary of the Merchants' Exchange, has figures to prove it. The 1915 jobbing was: Dry goods, \$75,000,000; groceries, \$65,000,000; boots and shoes, \$55,000,000; lumber, \$40,000,000; woodenware products, \$20,000,000; electric industries, \$18,000,000; soaps and candies, \$16,600,000; tobacco and cigars, \$55,000,000; hardware, \$50,000,000.

Statistics for 1916 have not been tabulated, but the increase is estimated at not less than 30 per cent in any of these lines, and in hardware, electric supplies and shoes the figures are expected to run even higher. No comparisons as far as farm implements, vehicles and motor cars are concerned are available from the exchange. They are grouped in 1915 at \$20,000,000.

This increase in jobbing trade is one reason why St. Louis dealers can expect to sell more cars than ever before. An-

DEALER SITUATION

other is the increase in bank clearings. The clearings for 1916 were more than \$1,000,000,000 higher than those of 1915, while January, 1917, showed an increase over January, 1916, of more than \$60,000,000. Beer is an important industry in St. Louis, and it amounts to about \$35,000,000. The motor car equipment business is a growing one. Two new tire concerns, several body factories and some specialty factories have been established. A heavy building year is foreseen in view of the \$3,000,000 in bonds voted for schools.

Country Largely Farming

The nearby country is agricultural largely. Last year was a record breaker in prosperity. The Illinois coal mines are working to capacity at high prices, and the Missouri lumber and zinc regions are busy. The only drawback is a shortage of labor. The Southern states have a wonderful prosperity. Oklahoma and Kansas oil and wheat beneficiaries are buying high priced cars.

As to trucks: The dealers report the factories are at the height of production through war orders. Truck selling here is chiefly a question of energy and demonstration, and local dealers seem strong in both. The opening of the free bridge across the Mississippi has opened a vast field. The cheapest toll previously for a car was 70 cents a round trip. Heavy vehicles paid more. As a result, merchants waited until freight cars came across, even when switching tonnage was charged and terminal blockades delayed shipments. Now coal and other firms want trucks for hauling freight across the city bridge, which is free. One coal firm is negotiating for a dozen high priced trucks and more trailers.

Ford Contracts Almost Double

The Ford dealers here have contracted to sell 5,000 cars against 2,600 last year. They are ahead of the schedule now and think they will sell more. Hundreds of families with small incomes now have machines. Two were sold recently to brewery employees who live on their earnings and savings. The Chevrolet dealers report

AIRPLANE MAKERS ADMITTED.

New York, Feb. 16—So important are the strides made in the aeronautic industry considered that the Motor and Accessory Manufacturers' association has decided to admit makers of airplane engines, parts and accessories to membership.

much the same prospects. One of them ran a hotel before he sold cars. He now has sold his cook in the hotel a car.

Another great reason for continued prosperity and the resulting sale of cars is that the Allied armies have bought 230,000 horses through the East St. Louis horse and mule market since the war began, paying more than \$42,000,000 for them, an average of about \$190 an animal. Every team sold meant money for a car, and gasoline is cheaper than hay at present.

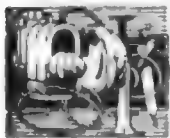
No Munitions Orders Excitement

St. Louis manufacturers have not got excited over munition orders. The city has done as little business along this line as any city of importance, and most of the factories that took munitions contracts have got rid of them and now have their employees working in other lines. The shoe dealers refused to take any orders for foreign army shoes but are overwhelmed now with orders for civilian shoes for the warring countries. The electrical concerns and a few foundries took some orders but have completed them and turned to other lines without loss of working force. About the only lines continued are gun stock factories, and these have prepared for the future.

St. Louis dealers have to fight an unnatural division of territory. The makers divide Missouri in half north and south, whereas the natural division is east and west. The trade follows the railroads, and the line is drawn diagonally across the state, beginning at a point on the east side, 50 miles south of the northeast corner, to a point on the west side, 50 miles north of the southwest corner. Thus the Chicago-Kansas City railroads and their immediately territory is thrown to the Kansas City dealers, and the St. Louis roads to the southwest and immediate territory are thrown to the St. Louis dealer.

Division of Territory

Hannibal, which is on the Mississippi river and appears to be in St. Louis territory, goes to Kansas City, while Springfield, which is in the southwest corner and appears to be Kansas City territory, comes to St. Louis. The trade follows these lines, and the efforts of the makers to change the natural divisions have served only to bring added difficulty of distribution. The territory on the mid-state railroads between St. Louis and Kansas City is no man's land. There is a trade war always on. A St. Louis motor car jobber once said he would give \$5,000 to any man who would convince his factory this is true.



The Accessory Corner



11-in-1 Wrench

THE new Ronson wrench combines eight sizes of wrench in one. It claims to fit every nut on a car and to release the desired size with a twist of the hand. The wrench is made of drawn tempered steel in nickel finish and weighs $\frac{1}{2}$ lb. It is 6 in. long and $\frac{1}{2}$ in. thick. It is called the eleven-in-one because it claims eleven tools in the one tool. New features are the alligator jaw, screw driver and crown opener. Art Metal Works, Newark, N. J.

Emergency Axle for Fords

This emergency axle stub will enable one to place a Ford car on wheels in less than 2 mins. in the case of a broken axle shaft, it is said. The car then can be pulled at any speed desired. The device is simple, as it merely hooks under the flange on the axle housing and a set screw on top when screwed down holds the stub firmly in place on the housing. The stub is made to take the Ford front axle cones, and a Ford front wheel is used. It weighs 7 lbs. Price, without cones, \$5. Ekern Bros. Mfg. Co., Flandreau, S. D.

2-in-1 Filling Gun

The Boe automatic oil and grease gun ranges in capacity from 27 to 100 lb. It dispenses and measures one or both kinds of lubricant separately or at the same time and retains the air-charge even though all lubricant is discharged. The entire top can be opened or closed for refilling in 4 sec. Charging is the same as for a tire. A 5-in. measuring dial is graduated to $\frac{1}{4}$ lb. or $\frac{1}{4}$ pt. The tanks come in red, blue and black finish. Prices, 27-lb., \$20; 32-lb., \$25; 100-lb., \$40. H. M. Boe Co., Minneapolis, Minn.

Westmoreland Piston Ring

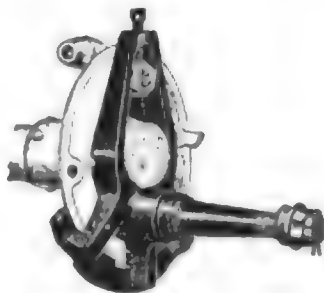
A new leak-proof piston ring has been invented by E. T. Westmoreland, Childress, Tex., which is said to have none of the common frailties of the double ring, such as unequal pressure from the rings, feather edges that break, excessively thin sections and so on. The ring is two-piece with a lap joint in the outer part and a bevel cut in the inner part. The two parts are constrained from moving on each other by the tongue and groove construction, and the two joints cannot move around together because of the dowel pin. The ring works equally well either side up and there is no possibility of wedging between the cylinder walls and the piston, it is claimed.

Commercial Car Windshield

Banker commercial car shields are designed for application to all commercial cars or trucks. Being designed for this purpose they are built of extra heavy material to render them practically indestructible and afford the



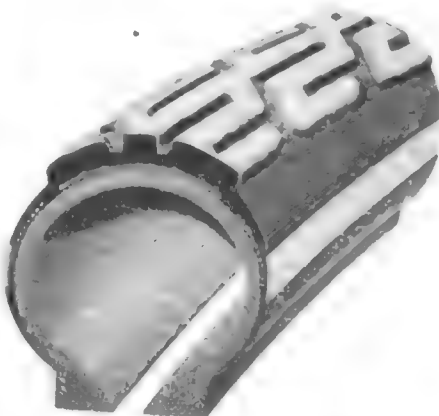
Filling gun that discharges both oil and grease



Device for placing Ford on wheels if axle shaft breaks



A wrench that is said to combine eleven tools



Cross-section of new anti-blowout, non-skid tire

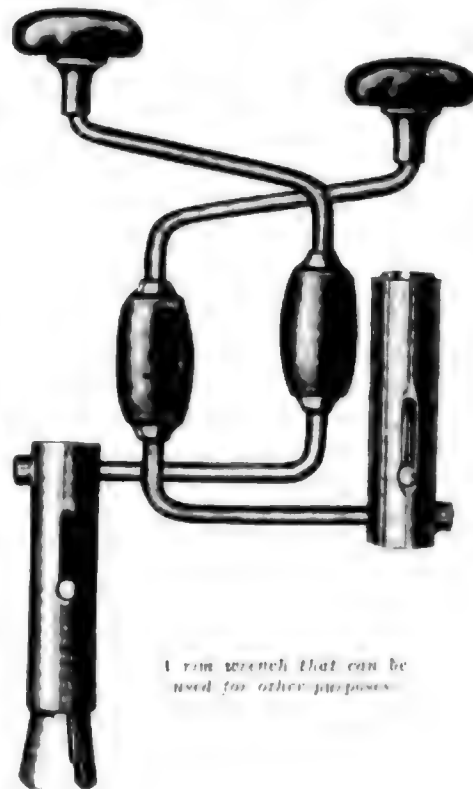
maximum of protection. Steel tubing, plate glass and channel rubber are used. The hinges are of the friction type, and the upper fold is adjusted for rain vision or ventilation by a slight turn of the wing nuts. Model 3 is of brass throughout to meet the requirements of commercial car owners and makers who do not desire the steel frame shield. Banker Windshield Co., Pittsburgh, Pa.

Utility Rim Wrench

The Utility Universal rim wrench is designed for removing all nuts used on demountable rims but can be used for other purposes. It adjusts itself automatically and can be operated with both hands. It works as a bit brace, enabling the operator to exert much pressure. When not in use it can be folded and carried in the tool box. Price, \$1.50. Hill Pump Valve Co., Chicago.

New Amazon Tire

The Amazon Tire & Rubber Co. has placed on the market a new tire that is said to be proof against blowouts. The anti-blowout feature consists of an extra fabric reinforced, or breaker strip, built into the side walls of the tire. The side-wall breaker encircles the tire, binding it into a unit and preventing the side walls from bulging or overstretching. The tire is made in the non-skid style only and has a jet-black body with a 1-in. white stripe on the sides. Amazon Tire & Rubber Co., Akron, Ohio.



A rim wrench that can be used for other purposes



Journal Pre-proof

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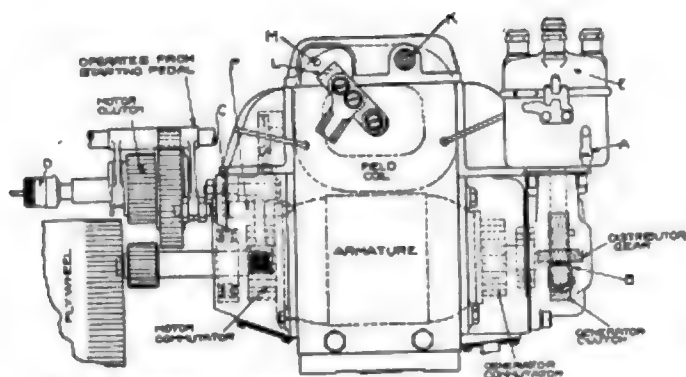


Fig. 190—Side view of Delco dynamotor, which usually is called a motor generator

cerned, which results in the voltage generated in the generator winding remaining practically constant. If the voltage applied to the motor winding be increased or decreased there will be a proportionate increase or decrease in the voltage produced in the generator winding. The fixed voltage relation in the dynamotor is its chief disadvantage when used in charging storage batteries, as the current sent through the battery must be adjusted by a series resistance rather than by varying the field of the generator as in the case of the motor generator.

The Dynamotor as a Starting and Lighting Unit

The dynamotor is used by several different companies in place of a separate generator and motor. The electrical and mechanical connections of the machine are such that the generator and motor actions are taking place at different times. A good practical example of the use of the dynamotor is found in the Delco system shown in Fig. 190. The terminals of the two sets of windings are brought out at opposite ends of the armature and connected to separate commutators. A diagram of the two windings is given in Fig. 191. There are nineteen segments in the commutator of the motor and just twice as many, or thirty-eight, in the commutator of the generator. These windings are placed in the same slots in the armature core. The magnetic field of the machine is produced by either a shunt or series

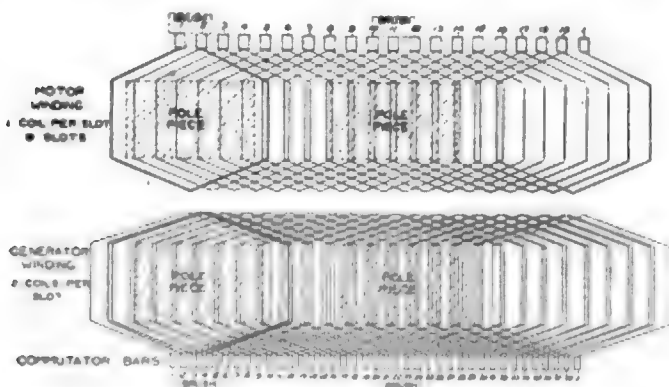


Fig. 191—Comparison of motor and generator windings on Delco dynamotor

coil, depending on whether the machine is acting normally as a generator or as a motor. The operation of the Delco dynamotor may be divided into three distinct parts, and these are:

- (a) Motoring the generator.
- (b) Cranking the engine.
- (c) Generating electrical energy.

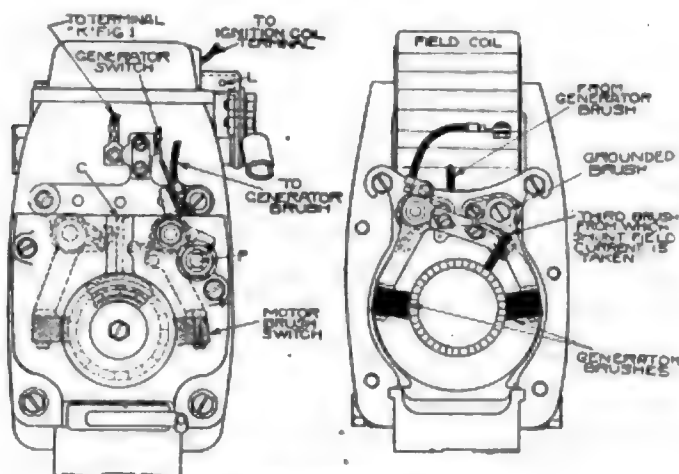


Fig. 192—End views of Delco dynamotor

Before discussing each of the above operations it will be best to explain what changes in connections take place when the ignition switch is closed and the starting pedal is pressed down. Closing the ignition switch connects the generator armature winding and shunt field across the terminals of the storage battery. As the starting switch is pressed down one of the brushes on the commutator of the motor, which normally is raised from the surface of the commutator, is lowered; a switch in series with the armature of the generator is opened; and the gears used in cranking the engine are thrown in mesh. See Fig. 192.

(a) When the armature and field of the generator are connected to the battery by closing the ignition switch a motor action takes place in the generator armature winding, and the armature starts to revolve. The connection between the shaft of the dynamotor and the engine is made by a form of over-running clutch which only transmits power when the shaft driven by the engine tends to run at a greater speed than the shaft of the dynamotor. This clutch, called the generator over-running clutch, allows the armature of the dynamotor to revolve freely, when the engine is standing still, in the same direction as it is rotated by the engine when the dynamotor is being operated as a generator.

(b) The motoring of the generator assists in bringing the gears into mesh when the starting pedal is pressed down. Lowering the brush on the commutator of the motor closes the motor circuit, which is composed of the motor armature winding and series field connected in series to the battery. At the same time, the motor action in the armature of the generator is stopped as the generator switch is opened. The dynamotor now is operating as a series motor and driving the engine. As soon as the engine starts to fire the motor will cease to transmit power to the engine, as a second over-running clutch in one of the gears allows the speed of the shaft driven by the engine to exceed the speed of the shaft of the dynamotor. The starting pedal now should be released, which raises the motor brush and closes the generator circuit.

(c) As soon as the engine speeds up power will be transmitted to the dynamotor through the generator over-running clutch. If the generator switch is closed a generator action will take place in the generator armature winding, provided the voltage in this winding exceeds the voltage of the battery to which the brushes of the generator are connected. When the voltage in the generator armature winding drops below the voltage of the battery, due to any cause, the generator will be changed to a motor, and power may be transmitted to the engine through the motor over-running clutch. A more complete description of this and other similar systems will be given later when the various complete systems are discussed in detail.

NEXT WEEK

The articles on Electric Motors will be continued in the next installment of the series on Electric Equipment of the Motor Car. If you have missed the first issues on this subject, you will find that the articles began in the issue of Dec. 14.













- 3—To the top groove.
- 4—A solution of potash.
- 5—It is impossible to approximate.
- 6—The present valve springs were designed to exert the exact pressure required. We see no reason why this pressure should be increased unless the values tend to lag.

WIRING DIAGRAMS OF 1915 CASE

Car Runs 5 Miles, Stops, Then Starts After Standing

Forest City, Iowa.—Editor MOTOR AGE—Publish a diagram of the lighting and ignition system used on the 1915 Case car.

2—Give the bore and stroke of this car.
3—Can Motor AGE tell what is wrong with this car? It will run all right for about 5 mi.; then it will stop; and after it is left standing for a few minutes will start and run about 5 mi. again. This car will run about 6 or 7 mi. on a gallon of gasoline. The lights are in good condition, and the battery is fully charged, and it will not start at all.—L. Thompson.

The ignition in the model 35 was taken care of by a separate Bosch system. The wiring diagram of this system is shown in Fig. 5. The wiring diagram of the starting and lighting system is shown in Fig. 6.

2—The bore and stroke of the model 35 is $4\frac{1}{4}$ by $5\frac{1}{2}$.

3—It sounds like a stopped up gasoline line, though your information is very meager. It might be that the line was clogged somewhere between the tank and carburetor so that an amount of gasoline too small to meet the demands of the engine would get through.

WANTS INNER SLEEVE FOR FORD

Suggests Economy Measure in Reducing Engine Bore

Milan, Minn.—Editor MOTOR AGE—In regard to reduced gear ratios, smaller cylinders, etc., permit me to express my views concerning the Ford car. As this car has a $3\frac{1}{2}$ in. bore by 4 in. stroke, could not some concern supply those of us that might want it, with a sort of shrapnel affair—a cylinder having $\frac{1}{4}$ in. walls fitting into the $3\frac{1}{2}$ in. regular cylinder and reducing the bore to $3\frac{1}{4}$ in.? With a Ford engine of $3\frac{1}{2}$ in. bore by 4 in. stroke and aluminum pistons I believe the acme of economy including freedom from need of tightening up connecting rods would be provided. If the gear ratio would have to be reduced, a thing I do not think would be necessary, the suppliers of the inner cylinders and pistons would doubtless be willing to attend to this. Perhaps the flywheel could be reduced in circumference, especially if the ignition was replaced by a high-tension magneto. Posing this on I suggest that the next change in type will be to substitute for a strictly vertical engine, one having an inclination to lean to one side, or one with inverted crankcase and pumping oil out of the cylinders instead of splashing it in.—H. Skreberg.

It is a good suggestion. Although it is MOTOR AGE's opinion that the car would be underpowered for country driving it might find its field for city use or where the roads are unusually level. There is no doubt but that the car would be one of good economy. We do not understand

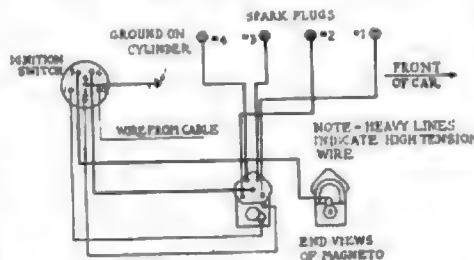


Fig. 5—Wiring diagram of Bosch ignition system used on Case, model 35

your suggestion regarding the inverted crankcase. Surely you do not mean using the cylinders for oil wells.

READER DESIGNS HIS IDEAL CAR

Has 135- to 140-in. Wheelbase, Disk Wheels, No Running Board

St. Louis, Mo.—Editor MOTOR AGE—The design shown in Fig. 8 is for a perfect motor car. The wheelbase ranges from 135 to 140 in., the tires are 35 by 5, or smaller, and are cord. The car is hung very low. The wheels are wire disk like the Rolls-Royce and the exhaust is placed on the side like the Biddle. The car has no running board.

The front seats are divided which permits one to enter the back seat. The gasoline is carried in the tail and tires carried on the side. Springs are semi-elliptic front and rear. The windshield is slanting to make a racy appearance. The rear cowl is so low it hardly is noticeable.

Other equipment is Boyce motometer, Hartford racing type shock absorbers, and a Continental or Duesenberg motor. —George Harrington.

MOST POWERFUL STOCK MOTOR CAR

Not Necessarily the Fastest—Hudson Has Stock Chassis Speed Record

New Orleans, La.—Editor MOTOR AGE—What is the most powerful stock touring car made?
2—Is the most powerful car the fastest?
3—About what speed is attained by the Pierce-Arrow 60?

4—What is the value of the racing Peugeot cars as used by Aitken and Besta?—J. T. Swoop.

- 1—There have been no official tests. The Hudson has the stock chassis speed record.
- 2—Not necessarily.
- 3—No official records.
- 4—This cannot be published at this time.

EFFECT OF WATER VAPOR IN GAS

Supposed to Oxidize Carbon and Increase Explosion

Chandler, Colo.—Editor MOTOR AGE—Is there any device or scheme which introduces water, steam or vapor into the carburetor or intake manifold or which in any way will increase the moisture of the air that mixes with the gasoline or gasoline vapor going into the cylinders that will really remove carbon?

2—If there is such a contrivance, explain how the dampness will remove carbon.
3—If it does not remove carbon, will it prevent the formation of same in the cylinders, and how does it do it?
4—Explain how increasing the dampness of the air causes the engine to give more power and run more even. Most anyone will notice this on a rainy day or just after a rain. This seems true in this country, Colorado.

5—Do the numerous devices that are, or rather have been, sold more in the past for the taking in of air through a small hole in the manifold decrease carbon formation, and how do they do it, that is, from a chemical point of view?

6—Is there a way of decomposing water into hydrogen and oxygen other than by electrolysis, or use of chemicals?

7—Is hydrogen gas explosive without the presence of oxygen?

8—Is Oxy-hydrogen more explosive than just pure hydrogen? Which would give the more power for running an engine, hydrogen or oxy-hydrogen compared with gasoline? Does Motor AGE know of any tests that have been made?

9—Does MOTOR AGE know if Louis Earlight or Mr. Morrison's claims for generating hydrogen gas by the decomposition of water by chemicals has been practicable? Whatever became of their process? If such was true that they had run an engine or an engine could be run by hydrogen or oxy-hydrogen, would a carburetor be necessary?—Reader.

1—There are now several devices on the market which inject water vapor into the manifold and thus combine it with the intake gas and from the volume of sales existing they surely must have merit.

2—The dampness is supposed to remove the carbon by oxidizing it. The theory is that the water is differentiated into oxygen and hydrogen, the former combining itself with carbon to form a gas which passes out of the muffler.

3—The device is supposed to keep carbon from the cylinders by the same chemical action.

4—It gives the gasoline vapor more burning force because of the greater amount of oxygen.

5—These are finding as large or a larger sale than heretofore. It hardly seems reasonable to suppose that they will prove a great aid in removing or keeping out carbon unless one considers that their function is to give a more perfect mixture, and that a more perfect mixture means more thorough burning of fuel and thus less free carbon. From a standpoint of fuel economy there is no doubt but what they are of value.

6—Not so that they may be retained. Water in an exploding cylinder is supposed to differentiate into its elements.

7—No.

8—Yes. MOTOR AGE knows of no tests that have been made.

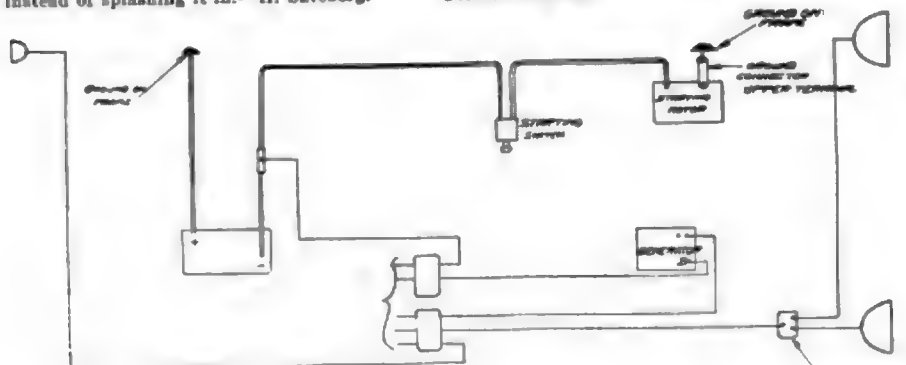


Fig. 6—Wiring diagram of starting and lighting system on 1915 Case

9—These processes have never been developed to a standpoint of practicability as far as we know.

TIRE DOUGH RADIATOR PLUGGER Reader Happens on Remedy He Says Is Best Yet

St. Paul, Minn.—Editor MOTOR AGE—It may interest some of the MOTOR AGE readers to know what will positively stop a bad radiator leak. Simply plug it from the outside with tire dough. This will stop leaks large enough to stick a lead pencil in. Last summer my fan came off and cut half a dozen holes in the radiator, one large enough to put my little finger in. Did not know what to do as I was out in the country, but as an experiment tried tire dough. It worked beyond my hopes, made a water-tight repair, and I did not have it soldered for 3 weeks, and when I did have it taken care of an old radiator man was amazed to know that any substance would stop a radiator in the condition mine was in.

If my little find will help out some motorist, am glad to pass it along. Might also add that should any reader have the misfortune to break a pump or magneto shaft when miles away from a town, a very satisfactory temporary repair can be made in a short time by finding a green sapling of about the proper size, remove the bark and with a jack knife cut and whittle to resemble broken shaft, retune the motor, and he will get along O.K. until he reaches a machine shop.—Maynard Norton.

High Gears in Ford

Knoxville, Tenn.—Editor MOTOR AGE—What speed could be obtained with a Ford car fitted with 2½ to 1 gear ratio?

2—If the above car was equipped with Stromberg carburetor, Atwater-Kent ignition and Lydite aluminum pistons, would it make 65 miles an hour?

3—Which is the best carburetor for Ford cars, Stromberg, Rayfield or Miller?—Lucian Zates.

1—Jobs have been built up which have shown a speed better than 75 m.p.h.

2—Yes, if the fittings are properly made.

3—MOTOR AGE cannot offer preference.

Speedometer on Old Chalmers

Washita, Ia.—Editor MOTOR AGE—Kindly give suggestions for installing a speedometer on a 1913 Chalmers model M torpedo roadster. —Clifford Law.

The speedometer may be installed under the cowl or, perhaps, preferably upon the steering column. Tell the speedometer

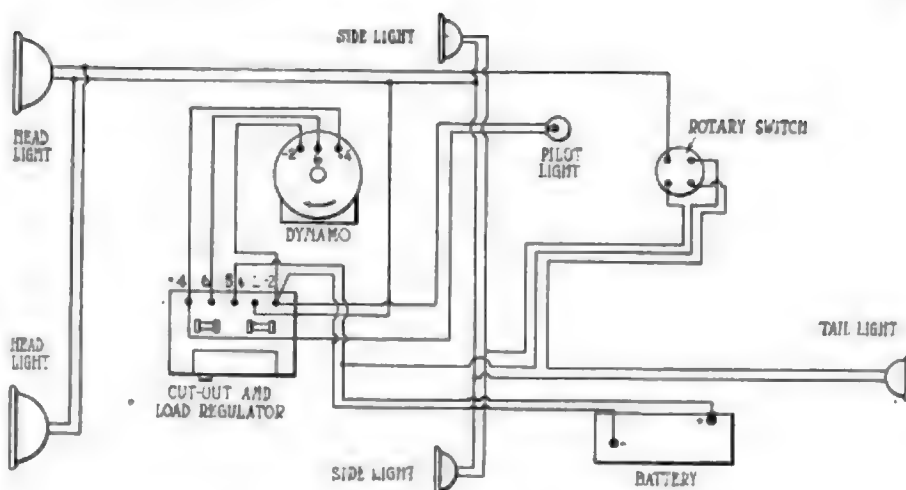


Fig. 7—Standard Apeldo wiring for 1912 systems

maker or station you want it for 36 by 4 or 36 by 4½ tires, depending on which you are using.

Battery for Lighting Ford

Wayne, Kan.—Editor MOTOR AGE—Would it be advisable to use storage batteries on a Ford car to run the head, tail and dash lights where there is no generator to keep charging them?

2—What size battery would be most successful for this work?

3—Give an estimate as to the number of hours it would run lights with one charging.

4—Would MOTOR AGE advise any certain make of battery for this work?—G. R. Teagarden.

1—This method of lighting Fords has considerable popularity.

2—An 80 amp.-hr. battery should handle the work.

3—Approximately 80 hr.

4—Any standard make. Several manufacturers have batteries especially suitable for just this kind of work.

Saxon Speeded Up

Ashtabula, O.—Editor MOTOR AGE—Would I gain more power by putting in Aluminite pistons and non-leaking piston rings in my 1915 Saxon four roadster? If any, how much?

2—Would a Rayfield 1¼ in. carburetor be too large for the motor? I have a chance to get a new one at a very reasonable price.

3—If I would have the new pistons ¼ in. longer to raise compression, would I notice any difference?

4—By making the above changes, how fast could my car run?—M. S. Sargent.

1—You would gain more power if the pistons and rings were properly fitted. So much hinges on the way the installation is made that even an approximate figure of the increase cannot be given.

2—We would suggest asking the Rayfield makers. MOTOR AGE cannot decide

upon carburetor sizes because of the diversity of kinds.

3—Slightly more power possibly. However, assuming you have the proper compression now, the change will not help any.

4—There is no means of estimating. Experimenting is the only test.

WIRING FOR OLD MODEL NORWALK Wants to Use Piston with Skirt ½-In. Longer

Zearing, Iowa.—Editor MOTOR AGE—Give a wiring diagram of the Apeldo lighting system used on the 1912 Norwalk overhead-valve six, which has no starter. Kindly show where to hook up the dash voltmeter and cutout.

2—Could pistons ½ in. longer than those with which the engine was originally fitted be used in a Northway 4 by 4 in.? The pistons are ½ in. longer from wrist pin center to head, and ½ in. longer from the wrist pin center to the bottom of the skirt.—W. Bissell.

1—The standard Apeldo wiring for 1912 systems is shown in Fig. 7. This should apply to the Norwalk car. The connections you ask for are shown in the diagram.

2—It depends entirely on the construction of the engine. If the engine is disassembled you can set one of the pistons at the bottom of its stroke and ascertain whether the bottom of the piston skirt comes to the bottom of the cylinder. Then set the connecting rod at the point where the arm of the rod is nearest the piston and ascertain whether the clearance is great enough to permit ½ in. more in the length of the skirt. There is no need of increasing the skirt length of the pistons so that it would project below the cylinder when on lower dead center.

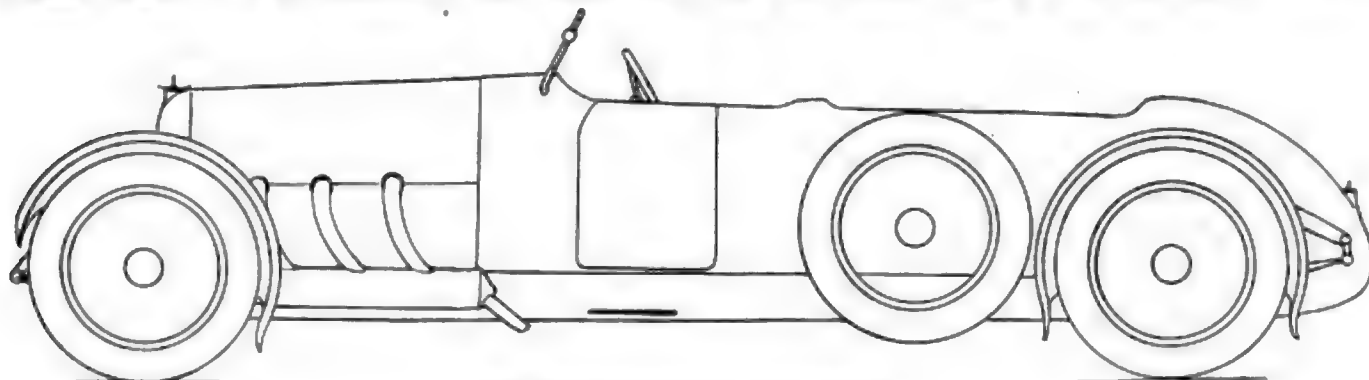


Fig. 8—Design of ideal car, made by reader

From the Four Winds

CENTRAL Illinois Trail Organized—The Peoria, Pekin and Bloomington trail has been organized with John Cook of Tremont as president. This route extends through Central Illinois and connects various north and south trails. The trail will be marked by a white band on the telephone poles, with the letters "P. P. B."

To Mark County Roads—Ottawa County, Michigan, has taken steps to mark its principal roads. The board of county road commissioners has decided to purchase twenty-four sign posts, which will be placed at the principal crossings. The sign posts are to be constructed of steel angles and will be rustproof with black letters on a white background.

Michigan to Have Another Route—Present prospects are that there will be a fine state road from Big Rapids to Cadillac, Mich., in 1917. Several bond issues have been voted on favorably by the townships along the route. The proposed road is the result of activity by the Mackinac Trail Association, of which L. F. Bertrau of Big Rapids is president.

Los Angeles Displays Flag—In the effort to stimulate patriotism following the breach in diplomatic relations between the United States and Germany, motorists at Los Angeles, Cal., were called on to display the national emblem on their cars. The response was more or less general. It did not seem to make any difference with some motorists whether the flag was placed properly or inverted; its presence was all that concerned them. It was not an uncommon sight to see a 5-ton truck at work in an excavation far below street level with the flag gaily floating from a stick attached to the radiator intake.

Asks Owners to Aid—The Champaign County, Illinois, Highway Improvement Association sent out 4000 postcards, asking co-operation in the campaign for the improvement of the highways. Each owner is asked to send a dollar to help pay the expenses of the movement to provide a bond issue for the system of hard roads which has been outlined. In the past the Champaign Chamber of Commerce has paid all expenses in the good roads propaganda, and it was thought only fair that the car owners, who receive the greatest amount of benefit, should help to put over the good roads bond issue.

New Route Is Planned—Although advocates of a bee line route for the Jackson highway through Alabama were defeated in the recent contest for the routing of this national road, they are planning to establish a route along this line, anyway. It is to be known as the North and South National highway. It first was planned to call the route the Lakes to Gulf highway, but the name chosen is believed to explain its advantages more fully. The highway will run from Chicago to New Orleans. It will follow the usual way from Indianapolis to Louisville and Nashville, but there it will diverge and will proceed in an almost due south line to Columbia, Tenn., Athens, Decatur and Birmingham. It will then pass through Montgomery, Selma and Mobile, Ala., and along the gulf to New Orleans. F. J. Crampton, Montgomery, Ala., is president of the association. L. N. Buell, of Cullman, is secretary. Headquarters will be at Montgomery.

Meridian Marked to Corinth—The Meridian highway is now marked as far south as Corinth, Miss. The latter city is the gateway to Shiloh National Park. The road from Corinth to Artesia, Miss., 150 miles,

has been improved by macadam treatment and is in good condition for southern tourists.

Memphis Bridge Ready Soon—A large part of Arkansas will be made accessible to traffic by the completion within the next few months of the viaduct and wagonway of the Harahan bridge. This will provide a link between Memphis, Tenn., and Eastern Arkansas. The viaduct alone will cost \$150,000, and preparations are being made to expend \$125,000 in improving roads in the vicinity of the bridge, so that full advantage can be made of the connection. Farmers in a large section will be enabled to use motor trucks to bring their crops to Memphis. Large sums will be saved annually in the marketing of cotton.

Los Angeles Fines Decrease—Four years ago fines collected in Los Angeles county for violation of the speed laws amounted to \$28,000. Now they have fallen off to such an extent not enough is collected to pay the

expense of the motorcycle patrol. The number of motor vehicles in use has more than tripled in that time, and the board of supervisors has started an investigation to learn the cause of the discrepancy.

Ask Official's Road Co-operation—A delegation from six counties in Pennsylvania numbering almost 200 persons visited the state highway commissioner to secure his and Governor Brumbaugh's co-operation in establishing a highway between Erie and Pittsburgh. The governor expressed his entire sympathy with the plan to secure through trunk-line routes on the highway system of the state.

Milwaukee to Help Wausau—The Wausau Automobile Dealers' Association, Wausau, Wis., selected the dates of Feb. 21-24 for its first annual show, which is being held in the grand opera house. In the conduct of this show the association is assisted by the Milwaukee Automobile Dealers, Inc., which has loaned the services of Bart J. Ruddle, who has managed the Milwaukee shows. A false floor was constructed so that the entire main floor of the theater is on a level with the stage.

Bridge Clears Way to Florida—The last big obstacle to motor traffic into Florida was removed with the opening of the bridge across the St. Mary's river at Folkstone, Ga., which was celebrated by a gathering of several thousand good roads enthusiasts on Feb. 7. This bridge is on the Dixie highway and will be used by hundreds of thousands annually. It is on the road from Waycross to Jacksonville, which at times has been impassable because of the swamps through which it runs.

Birmingham to Show—A state-wide advertising campaign has been started by Birmingham, Ala., dealers in an effort to obtain a record-beating attendance at the show to be held there during the week of March 5, when Fashion Week will also be held by local merchants. A large building is being erected on the lot on which Birmingham's new post-office is to be located, and the temporary nature of the structure is to be hidden by an abundance of decorative effects. H. B. Marks has been chosen as manager and Ted Brownell, Hubert Drennen, Bradley J. Saunders and Henry M. Bailey have been made the arrangements committee.

Would Tighten Theft Legislation—The International Motor Clubs, with headquarters in Philadelphia, is preparing a bill to be submitted to the Pennsylvania state legislature providing for greater penalties for motor car thefts. The bill would fix the fine at \$1,000 and would make it mandatory for all purchasers of second-hand cars to file a complete description with some state bureau. The certificate of character issued to members of the club to show to police authorities in various towns that they are responsible persons has received the endorsement of the mayors of Reading, Pa., and Atlantic City, N. J.

Corn Belt Route Organized—The Illinois Corn Belt Route, which extends from Burlington, Iowa, across Central Illinois to Effner, Ind., has been organized. This will be a short line to form a connection with the Dixie highway at Watseka, Ill., and to connect with various north and south trails at Peoria, Bloomington and Effner. The route will be marked by an 18-in. band of white around the telephone poles, with a 10-in. ear of corn stamped vertically. The association will affiliate with the National Highway Association and the Illinois State Highway Improvement Association.

Coming Motor Events

RACES

—1917—

- May 19—Metropolitan Trophy, New York speedway.
- †May 30—Indianapolis speedway.
- †June 8—Chicago speedway.
- June 23—Cincinnati speedway.
- †July 4—Omaha speedway.
- †July 14—Des Moines speedway.
- †July 28—Tacoma speedway.
- August 4—Kansas City speedway.
- †September 3—Cincinnati speedway.
- †September 15—Providence speedway.
- †September 29—New York speedway.
- October 6—Kansas City speedway.
- October 13—Chicago speedway.
- October 27—New York speedway.

†A. A. championship events for 1917.

SHOWS

- Feb. 19-24—Bridgeport, Conn.
- Feb. 19-24—Des Moines, Iowa.
- Feb. 19-24—Duluth, Minn.
- Feb. 19-24—Grand Rapids, Mich.
- Feb. 19-24—St. Louis.
- Feb. 19-24—Syracuse.
- Feb. 20-24—Salt Lake City, Utah.
- Feb. 21-23—Dodge City, Kan.
- Feb. 21-23—Springfield, Mo.
- Feb. 21-24—Bloomington, Ill.
- Feb. 21-24—Flint, Mich.
- Feb. 21-24—Wausau, Wis.
- Feb. 24-March 3—Newark, N. J.
- Feb. 24-March 4—Atlanta, Ga.
- Feb. 24-March 6—Brooklyn, N. Y.
- Feb. 26-March 3—Omaha, Neb.
- Feb. 26-March 3—Great Falls, Mont.
- Feb. 26-March 3—Utica, N. Y.
- Feb. 26-March 3—Charleston, S. C.
- Feb. 26-March 3—Wilkes-Barre, Pa.
- Feb. 26-March 3—Utica, N. Y.
- Feb. 28-March 3—La Fayette, Ind.
- March 1-3—Urbana, Ill.
- March 3-5—Green Bay, Wis.
- March 3-10—Boston.
- March 3-10—Washington, D. C.
- March 8-10—Bridgeton, Conn.
- March 5-10—Parsons, Kan.
- March 8-10—Jamestown, N. Y.
- March 5-12—Birmingham, Ala.
- March 6-10—Fort Dodge, Iowa.
- March 7-10—St. Joseph, Mo.
- March 12-14—Fort Worth, Tex.
- March 13-16—Vancouver, B. C.
- March 13-16—Fargo, N. D.
- March 14-17—Davenport, Iowa.
- March 14-17—Kenosha, Wis.
- March 14-17—Mason City, Iowa.
- March 17-24—Pittsburgh, Pa.
- March 19-24—Paterson, N. J.
- March 19-24—Cedar Rapids, Iowa.
- March 21-24—Trenton, N. J.
- March 27-31—Clinton, Iowa.
- March 27-31—Deadwood, S. D.
- April 4-7—Stockton, Cal.

Car Situation Relieved

Milder Weather and New Order
Are Given Credit for
Improvement

Makers Say Shipment Conditions
Are Better Than Reported

DETROIT, Feb. 26—The congestion of freight cars is somewhat relieved as compared with a week ago. Some shippers attribute this to the milder weather, others to the new order whereby freight cars must be reloaded to or toward the owning roads, which went into effect last week. A few of the traffic managers believe the new rule will work harm, but the majority are hopeful for good results.

Statements to the effect that all the makers are driving cars to dealers and distributors have been exaggerated somewhat, and other reports that the companies were seeking drivers to assist them to drive cars overland are likewise untrue. The Buick Motor Car Co. and the Reo Motor Car Co., both of whom were reported in news dispatches to be in need of hundreds of drivers, state that these reports are without foundation and that they have been besieged by thousands of letters from individuals who thought the dispatches correct.

Gets Enough Freight Cars

The Ford Motor Co. has found little difficulty in getting freight cars and is able to make all necessary shipments from Detroit. The company has not found it necessary to resort to overland driving.

The Paige-Detroit Motor Car Co. finds the freight car situation considerably improved and is getting its production under way with little difficulty. The company has been driving less than fifteen cars a week overland.

The Studebaker Corp. believes the freight conditions have passed their highest point of congestion. The company is not doing much overland driving and up to this time has not been forced to tie up or hinder its production.

The Cadillac Motor Car Co. states that the situation is improved and believes that it will probably clear up from now on. The company has been driving about fifty cars a day overland to points within a radius of Rochester, Pittsburgh and Cincinnati.

The Maxwell Motor Car Co., Inc., has obtained enough freight cars to enable it to make all shipments by rail and has found it unnecessary to resort to overland driving. The company is getting all the empties it needs here in Detroit, and makes shipments promptly.

The Hudson Motor Car Co. has shipped 436 cars overland within the last three weeks but now believes conditions will allow it to lower this number.

The Packard Motor Co. has approximate-

ly \$1,000,000 worth of cars on hand which it is unable to ship by rail. The company has cut down its production because of the situation and is driving as many cars as possible overland.

The Hupp Motor Car Co. is driving a few cars overland and is getting enough freight cars to handle the balance of its production, which has been reduced somewhat by the freight car shortage.

The Chalmers Motor Co. has found it necessary to reduce production and to drive about sixty cars a day to Chicago, from which point the cars are loaded on freight cars and shipped to their destination.

Dodge Bros. say that the situation is improved considerably and that more cars are being moved to and from the factory every day. The company drove 500 cars overland in one day two weeks ago and now drives about seventy-five cars a day.

Nearby cities find no difficulty in getting freight cars for out-bound freight but have had some trouble with in-bound freight and suffer somewhat from lack of material.

The Monroe Motor Co. at Pontiac, finds it can get enough freight cars to handle its production but is hampered slightly by a shortage of materials. The same applies to other Pontiac concerns.

Probably the most severe trouble has been experienced by the Reo company at Lansing, where production has been cut about 50 per cent and the majority of the cars made are driven overland.

The Willys-Overland Co. reports difficulty in obtaining sufficient freight cars but has not been forced to cut down production to any extent. The company drives about fifty cars overland daily.

HUPP NOW SHOW-TO-SHOW CAR

Detroit, Feb. 24—The Hupmobile capital-to-capital car, which recently completed its 20,000-mile journey around the United States, has now commenced another tour and will go from show to show visiting one show each week. The car is now at St. Louis and from there will go to Brooklyn and later to Boston.

ASCOT ENTRIES RE-OPENED

Los Angeles, Cal., Feb. 26—Special telegram—Postponement of the George Washington sweepstakes, which was scheduled for yesterday on the Ascot speedway to March 4 on account of rain, automatically reopened the entry list, and as a result Eddie Rickenbacher, who has just returned from Europe where he went in search of racing mounts for the coming season, may be numbered among the starters if he can get a car fast enough to make him a possible winner or placer in the 100-mile dash for the \$5,000 purse. If he is unsuccessful in this, he may drive an exhibition for track record in a Frontenac which has been offered him by Joseph Boyer. In the entry list are Cooper, Pullen, Boyer, Taylor, Toft, Weightman and others.

Wisconsin Engine Adds

Output to Be Increased 50 to 75
Per Cent—Capital Now
\$1,000,000

Development of Aviation Engine
Rapid in Last Year

MILWAUKEE, Wis., Feb. 27—The Wisconsin Motor Mfg. Co., Milwaukee, Wis., one of the largest manufacturers of motor car, truck, tractor and aviation engines in the world, has increased its capital stock from \$350,000 to \$1,000,000 and started work on plans for enlargement of its works at Forty-seventh avenue and Burnham street, which will make possible an increase of from 50 to 75 per cent in its output. This announcement was made today by Charles H. John, president and general manager.

The increased capital is the result of the declaration of a stock dividend of 100 per cent, in addition to the regular cash dividends, at the annual meeting of the company. The issue of \$1,000,000 is divided between \$700,000 common and \$300,000 in 7 per cent preferred stock. The present stockholders have subscribed for practically the entire issue, and only a small part is available to outside capital.

The Wisconsin company has been overcrowded with orders for motors for many months, and has continually taken steps to increase its capacity. Orders now on the books, however, will require important extensions to be erected without delay. The aviation engine business has been developed to a large degree in recent months, following the complication of international affairs. The Wisconsin company's customers for truck, tractor and passenger car engines also have placed largely increased demands upon the plant. The last fiscal year not only has been the largest in the history of the concern, but the most profitable, due to the enlargement of the volume of trade, making it advisable to increase the capital stock nearly threefold.

The Wisconsin engine probably is best known as the fastest engine developed in America, and is the product of the genius of A. F. Milbrath, chief engineer and designer. It holds all of the long-distance racing records in its application to the Stutz car driven by Gil Anderson and Earl Cooper in recent seasons. In the Wisconsin aviation engine, Mr. Milbrath has developed the maximum of efficiency, speed and power output, and it is regarded as one of the best designs ever produced in any part of the world.

HOLMES COMPANY INCORPORATES

Canton, Ohio, Feb. 22—Arthur Holmes, formerly vice-president and chief engineer of the Franklin Motor Car Co.; Charles

Rockwell, former sales manager of the Franklin company, with George Belden and C. G. Herbruck, are the incorporators of the Holmes Automobile Co., with a \$2,500,000 capitalization. As was stated in a recent issue of MOTOR AGE the company will make an air-cooled engine car and will erect a big plant in this city. The incorporators will complete the organization of the company and the sale of stock, \$300,000 of which has already been subscribed for. The capitalization will be divided into \$1,000,000 common and the rest preferred.

BELMONT PRODUCTION SOON

Toledo, Ohio, Feb. 26—The Belmont Motor Car Co., this city, expects to have its car in production in sixty days. The two final experimental jobs are running over the roads in the South at the present time and matters are being cleared away preliminary to a campaign for dealers and a final selection of all the component parts in the car.

The price has not yet been determined but the car is expected to sell for \$1,750. It has a Buda six-cylinder engine, and some of the leading specifications are: bore and stroke, 3½ by 5¼ in.; multiple-disk clutch; unit powerplant; Hotchkiss drive; three-quarter floating axle; 33 by 4 cord tires; wire wheels; and 122-in. wheelbase.

CONTINENTAL STOCK HALTED

Detroit, Feb. 27—Special telegram—The Michigan securities commission has issued an order which forbids the Continental Motors Corp. from paying more than 6 per cent on its common stock until the \$10,265,000 representing, according to the company's attorney, the value of patents, trade-marks, good will, etc., is reduced to \$5,000,000. Meanwhile the company's directors are given a specified time in which to adopt the resolutions necessary to carry out the order of the commission, and its stock is not legally salable until its resolution is adopted. The commission does not, for the present, interfere with sales on the stock exchange.

The Continental Motors Corp. has asked the Michigan securities commission for a rehearing on the grounds that all the facts were not presented. The company will present the data not before available at the rehearing and is confident that the commission's verdict will be favorable. The rehearing takes place tomorrow.

TO BUILD NEW FACTORY

Dayton, Ohio, Feb. 24—The Dayton Rubber Mfg. Co. has purchased 21½ acres for a new factory, which they expect to have in operation about the first of June. The main building will be about 500 ft. long and 150 ft. wide, part of which will be one-story and part three story. The second story will be occupied by offices, and the third floor will contain a large hall for employees and their friends. The power plant will have a separate building 70 by 90 ft.

Redden Location Picked

Directors Vote to Establish Plant and Offices at Jackson, Mich.

Briscoe Dealers to Handle Trucks Throughout Country

JACKSON, Mich., Feb. 26—Directors of the new Redden Motor Co. voted Saturday to locate the Redden plant and offices at Jackson, Mich. Redden trucks will be made here, probably with steel from Joliet mills, in which some of the directors are interested. Briscoe dealers throughout the country will handle the truck.

The company has tried to get \$100,000 worth of stock subscribed at Jackson, but after \$65,000 of this amount was subscribed, the sale was halted as stockholders of the Briscoe Corp. and New York and Chicago capitalists had largely over-subscribed the offer. The Redden industry will have an approximate payroll of \$2,500,000 and will augment considerably the motor car industry in Jackson.

PIERCE-ARROW EARNING LARGE

Buffalo, N. Y., Feb. 26—The Pierce-Arrow Motor Car Corp. in 1916 earned over \$4,000,000 after all depreciation charges. This is equivalent to \$12.80 a share on the 250,000 shares of common stock outstanding, no par value, after allowing for 8 per cent dividend requirements on the \$10,000,000 preferred stock outstanding. Profits of \$4,000,000 in 1916 compare with \$4,301,000 in 1915. Comparison of earnings in recent years is made below:

1916 calendar year	\$4,000,000
1915 calendar year	4,301,000
1914, 18 months period	1,714,000
1913, June 30, year	1,484,000
1912, June 30, year	2,142,000

TESTS NEW FUEL DEVICE

Chicago, Feb. 27—To test a so-called hydro-pneumatic, gas generator, the invention of J. W. Duntley, head of the Chicago Pneumatic Tool Co., a Little Giant 2-ton truck was driven from Chicago to Des Moines, Iowa, last week, making the 393 miles on 42 gal. of fuel mixture composed of half gasoline and half kerosene. Ninety-five miles of the distance was made in low gear on account of bad roads. The truck, loaded to capacity, left Chicago last Thursday and arrived in Des Moines Sunday for the opening of the Des Moines show.

No carburetor is used with this new type of fuel generator. A primer is used for starting, and once the engine is warm the fuel mixture, coming in contact with the heated manifold, vaporizes. Water is introduced into this fuel mixture from a special tank with an atomizing attachment, and this introduction of water vapor is designed to eliminate carbon. The generator

is a new product and is being tested out with the thought of adapting it to passenger cars as well as to trucks. Tests are now being made at Armour Institute. Fuel used with this generator will cost about 14 cents a gal. at the present range of prices for gasoline and kerosene. According to officials of the Chicago Pneumatic Tool Co., maker of the Little Giant truck, a passenger car which conveyed the truck to Des Moines used 2 gal. more gas on the trip than did the fully loaded truck of the half-and-half mixture.

FEATURE GAS MIXER

New York, Feb. 26—The Deppe Motors Corp. was incorporated recently with a capital of 500,000 shares, par \$10, to build engines that will use any mixture of oils lighter than lubricating oils, such as distillates, kerosene, benzine, naphtha and gasoline.

The corporation will have a working capital of over \$1,000,000 with no debts of any character. There are no bonds and no preferred stock. It has acquired the exclusive rights to produce the superheated gas generators and engines under the patents held by W. P. Deppe of Bayshore and this city.

The Deppe generator is a device which, by using a small part of the engine exhaust gases, makes a superheated gas of all fuel oils. The corporation will lease suitable plants, and it is intended to pursue a pure assembly method of producing passenger cars, trucks, etc. The engine will be a four-cylinder, four-cycle type.

The board of directors includes the following: W. P. Deppe, C. E. Parsons, of Parsons-Simpson, consulting engineers; N. D. Lancaster, director of the Howe Seale Co., formerly of R. A. Lancaster & Sons; M. O. Guiss, manufacturer of iron products; and R. B. Sperry, of Sperry Co., investment securities, who is offering 100,000 shares of the stock to the public.

PERLMAN SUES FIRESTONE

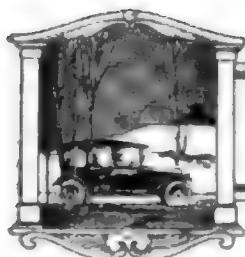
New York, Feb. 27—Special telegram—The Perlman Rim Corp. has brought suit against the Firestone Tire & Rubber Co., alleging infringement of its demountable rim patent No. 1,052,270.

BARLEY MOVES TO KALAMAZOO

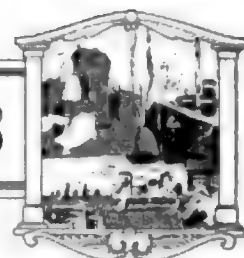
Detroit, Feb. 27—Special telegram—The Barley Motor Co., Streator, Ill., maker of Roamer, is moving to Kalamazoo, Mich., to occupy 83,000 sq. ft. of floor space of the old Michigan Buggy plant.

STEWART-WARNER ELECTS

Chicago, Feb. 27—Officers of the Stewart Warner Speedometer Corp. have been elected as follows: President and general manager, C. B. Smith; secretary, W. J. Zucker; treasurer, T. T. Sullivan; chairman of the board, L. H. LaChance; first vice-president, V. R. Bucklin; second vice-president, W. J. Zucker; third vice president, T. T. Sullivan.



EDITORIAL PERSPECTIVES



Race Drivers in War Time

NOW that Uncle Sam is taking such a careful census of his resources in men and materials with an eye as to how they can be best employed in the defense of the nation in time of war, it may not be amiss to observe that in our racing car pilots, it is probable that we have the foundation for an aerial fleet which would be most valuable. Those who have watched the careers of the foreign racing drivers of note since the opening of hostilities in Europe will remark that nearly every famous racing driver of the old world is serving his country in the aviation division of its army or navy. The most of these have been pilots of airplanes on scout duty and nearly all of them have been mentioned for bravery from time to time in the despatches. Others have been placed in charge of aviation squadrons. For instance Chassagne, the Sunbeam pilot, is now in charge of the Sunbeam aviation engines in Paris.

✱ ✱

THE peculiar adaptability of a racing driver and also, to some extent, his mechanic to the piloting of airplanes in time of war is very forcibly presented by Rickenbacher, the American race driver, who has spent some time in Europe studying these conditions and whose hurried return to this country was caused by his desire to be at his country's call in case of actual hostilities. It is his belief that one of the most effective of the civilian

departments of defense in case of war would be a volunteer aviation corps with American race drivers and their mechanics as the basis.

✱ ✱

RACING drivers already possess four most essential characteristics of the successful wartime aviator. These are: first, nerve; second, a concept of speed; third, judgment of distance, and fourth, a knowledge of engines. These things are more basically necessary for successful aviation, particularly in time of war, than is the actual technique of the control of an airplane, for the latter can be acquired within a very short time. Experiences of the aviation departments in the European armies have shown that the actual flying can be learned in thirty days or less, but the average aviator in Europe has required at least six months to become sufficiently well acquainted with the other essentials to make him valuable in the field.

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THE function of American racing drivers then, in case of America becoming actually involved in the war, would be as a nucleus of a volunteer aviation corps in which the racing drivers would serve as instructors to other volunteers in the mechanics of the airplane. It is understood that plans are now under consideration for organizing the racing drivers for this.

Can We Mobilize the Motorist

WITH the war clouds hovering over America's doors and with preparedness as one of the chief topics of thought, American motorists have begun actually to consider by what means they and their cars may be devoted most effectively to purposes of defense. The very important part in the European war that has been taken by motor cars and by volunteer motorists has shown how much worth while will be some definite plans for utilizing the vast resources of the country as embodied in the 3,000,000 motor cars and motorists and the 300 motoring organizations of the country.

✱ ✱

IN many cities there are now under way well organized projects for placing a great number of motor cars at the service of Uncle Sam on a few hours' notice. Car owners are volunteering their services and, in several states, military censuses are being taken to determine how many men and cars would be available if they were needed by the army or navy for purposes of defense. The most work along this line has been taken in California. Over a year ago the Automobile Club of Southern California organized

a military motor corps which has been accepted as an auxiliary to the state troops and with this organization as a basis, the club has launched a plan for national mobilization which it hopes will be accepted throughout the country. If all the 300 motor organizations in the United States can be made to co-operate under this plan, it is declared that it will be possible to mobilize 1,000,000 motor cars with their owners at 9 different cities within 12 hours.

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IN many of the states there are no state laws which authorize making the motorist a part of the National guard or militia. In Illinois, the plans for the organization of a voluntary motor reserve have been halted for this reason. The Chicago Automobile Club started the organization of a motor reserve among its members last August, when the Mexican trouble was most acute but was asked to wait until the federal authorities could arrange definite plans for their co-operation with the state and federal troops. Now the question of what such reserves could do is even more vital.

National Defense and Roads

IN connection with the defense plans of the federal government and more particularly the use of motor cars in these plans, too much cannot be said about the part which connecting highways throughout the country would play in military mobilization purposes. It is probable, even should this country be fortunate enough not to become involved in the European struggle, that the awakening of public mind and government interest in our needs for national defense will result in a very decided extension of the improved highways throughout the country. This is more probable, even when we consider the part that motor vehicles may play in any warlike activities. For them good roads are not only desirable, but necessary.

ACCORDING to Senator Bankhead, the chairman of the Senate committee on post offices and post roads, the present federal appropriation of \$85,000,000 is but a beginning in the work that the national government shortly will be doing in the matter of road construction. This money is to be expended during the next five years and with it there will be an additional \$75,000,000 contributed by several states, and the senator expects to see that congress will appropriate annually from \$50,000,000 to \$75,000,000 for highway improvement with the main idea of its adaptability to military necessities. He predicts that this will be the partial reason for the existence in the United States within this generation of the greatest system of highways to be found anywhere in the world.

Will You Tell Us of

Worth-While Short Trips

That We May

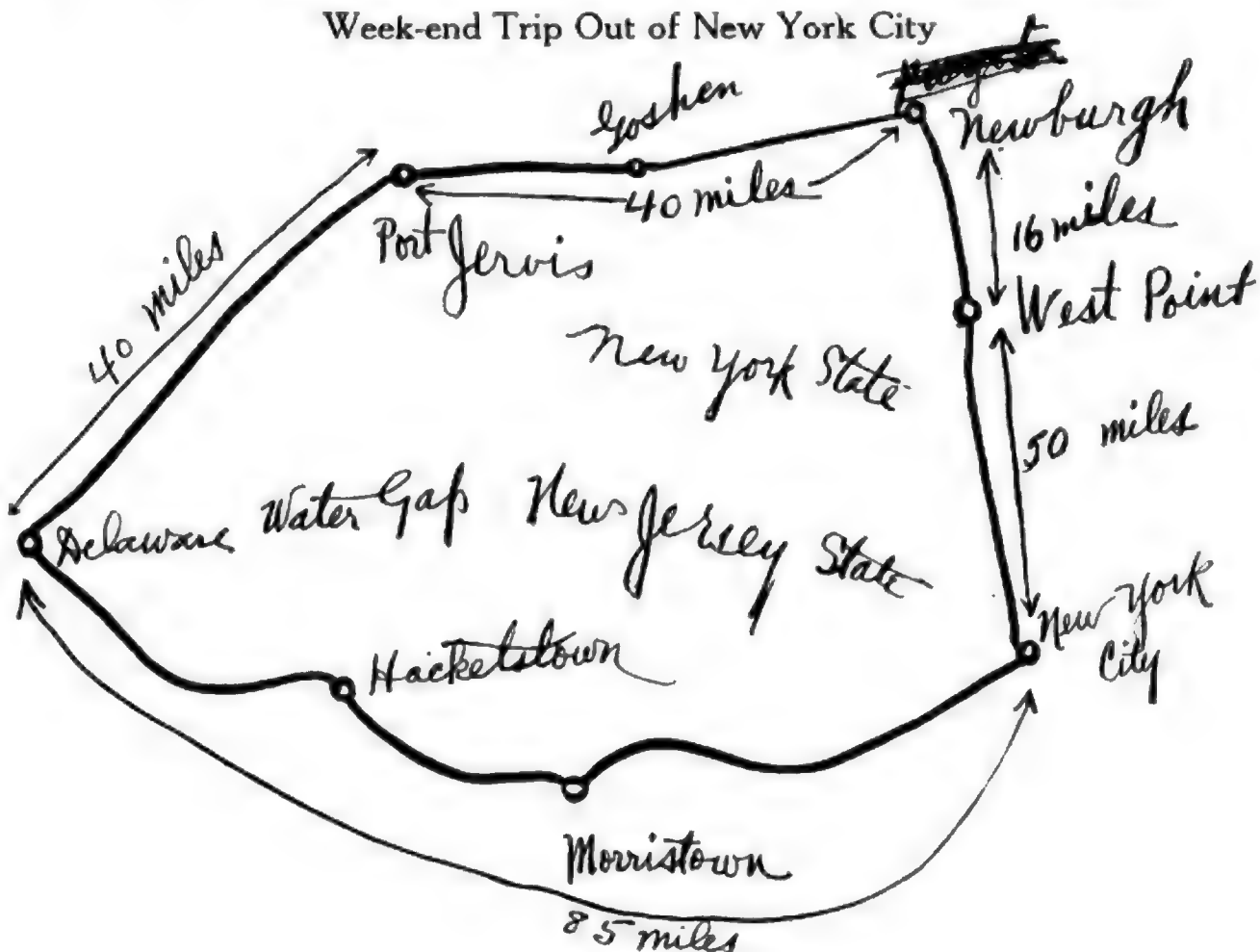
Pass Them on to Others?

YOU'VE all heard the parable of the three talents. In which category are you? Wouldn't you consider it a privilege to give your fellow motorist—you know motorists are invisibly joined in one big fraternal family—information that would help him to discover new places to go and easy ways of getting there; not only easy ways but the best ways? That is just what we are asking you to do and we are counting on your practice of the Golden Rule for the success of the plan. We have asked you to mark April 5 on your calendar in red since that is the date of the annual MOTOR AGE touring issue. We are going to give in this issue many maps in colors of various sections of the country which will show the best roads that virtually bind each town of the whole country together. Now, here is where you can do your fellow motorist a good turn and

he is going to do as much for you. We want a rough map similar to those shown on these two pages, outlining the best motor trips for week-end or three or four-day trips around your home. You know your own vicinity best and we want you to tell us in your own way just what trips you would recommend to anyone who wishes to come into your vicinity. We want to know the condition of the roads, what there is to be seen enroute, and any other information such as you would give the tourist if he stopped you on the road and inquired.

This is going to be a banner touring year. The annual touring issue of MOTOR AGE is going to be designed along the line of real service. Not only will it tell you where to go, but how to get there and what you should see during the tour over any one of thousands of suggested trips.

Week-end Trip Out of New York City



What are the best motor car trips for those who would take week-end journeys of all day Sunday or perhaps Saturday afternoon and Sunday, around your home?

We have given you an idea of the kind of maps we would like you to send us. Also there is a suggested form of letter that covers these two trips shown on the maps. You will

note that principal cities and towns are given and the distance between. Be as specific with your information as you can. Tell your story just as you would want someone else to tell you about the trips that can be taken from their home town.

Fifteen minutes—a half hour at the outside—will enable you to give us all the information we need. You know the old saw about procrastination. Won't you get this information to us at once? April 5 is not far away and in that issue we will pass back to you a hundred-fold more information about short and extended tours than

What are the best motor car trips around your city for such holiday periods as Decoration day, July 4, Labor day, when you would probably only be gone two or three days?

we ask you to give. We know you will appreciate this information, but not one iota more than we shall appreciate your co-operation with thousands of others in its preparation.

This Is How to Describe a Tour

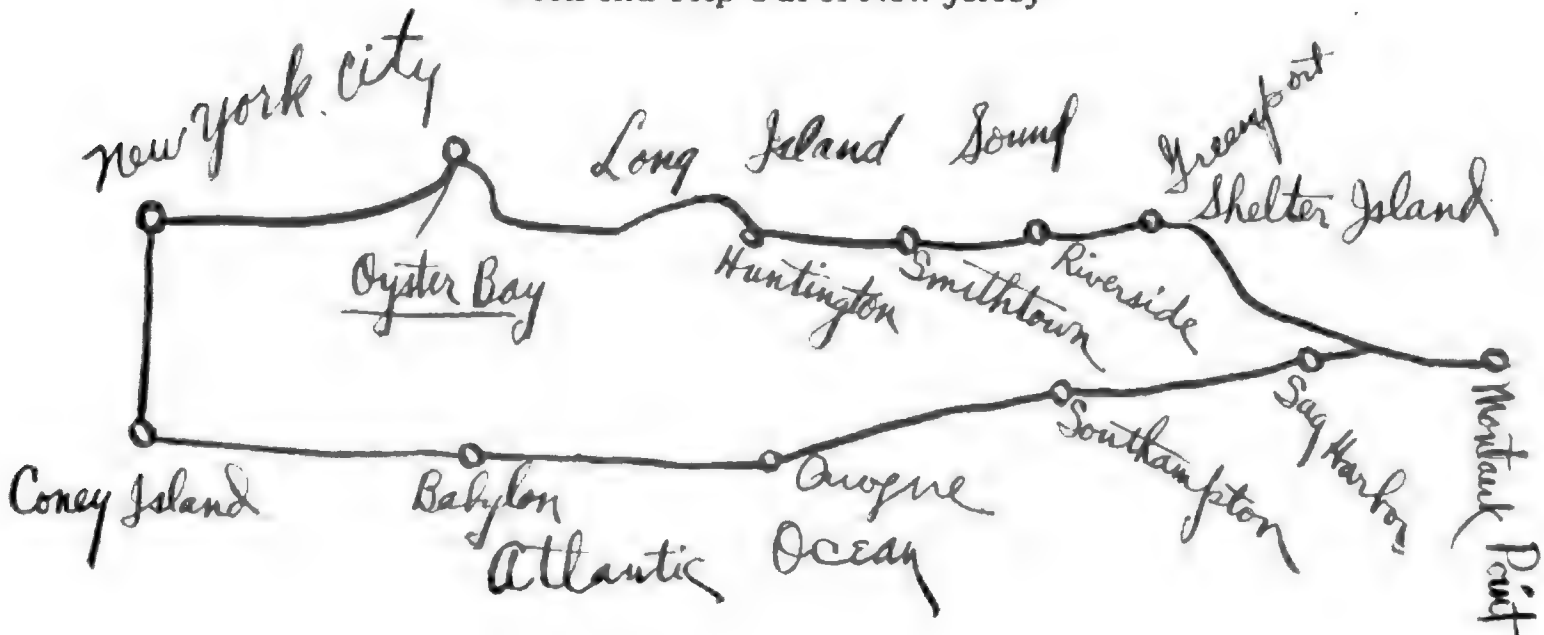
NEW YORK, Feb. 23.—One of the nicest week-end tours around New York City is to the celebrated Delaware Water Gap in Pennsylvania. You cross the Hudson river and go over fine bitumen roads to Morristown, N. J., where Washington had headquarters and where the house he occupied is still standing. You then cross Schoolie Mountain, one of the hardest climbs in all New Jersey, and go through Hackettstown to the Gap. You can leave New York at noon and are at the Gap for a 6 o'clock dinner. The following morning you have a fine ride up the Delaware river to Port Jervis and then cross over to Goshen, which is near the famous estate of the late E. H. Harriman, the great railroad builder. You then go through rolling country to Newburgh on the Hudson river. Here you turn south along the Hudson and cross Crows Nest Mountain to West Point, the great military school, on the Hudson. From West Point it is a fine 50-mile ride along the Hudson to New York City.

There is another fine week-end trip out of New York, and it is around Long Island. It takes you all Saturday afternoon and all day Sunday. You leave along the north side of the Island and pass through Oyster Bay, the home of ex-president Roosevelt. You continue along the north of the Island not far from the Motor Parkway,

which was built for the exclusive use of motorists. You pay \$1 to make a trip over the 50 miles of it. You travel along the north shore for 112 miles to Shelter Island, where you cross over a couple of ferries to the lower side of the Island and then go through Sag Harbor and out to the very end of the island at Montauk Point, where there is a famous lighthouse. You are over 140 miles from New York City. You return to the city along the south shore, passing through the places shown on the map. The road is good all of the way, except for 10 miles going to Montauk, where you have to go through deep sand and often get stalled and have to be drawn out with a couple of teams of horses. On your way home you pass through a score of pretty towns and finally can stop at Coney Island, which, while a little off the route, is full of interest, especially from the amusement standpoint.

There are many other week-end trips. You can go to Albany, N. Y., 150 miles up the east side of the Hudson, and come home along the west side, thus passing through the Catskill Mountains. And if you like you can go to Atlantic City on the Jersey coast, passing through a chain of resorts along the shore. You can return by Philadelphia.—H. J. Jones.

Week-end Trip Out of New Jersey



Rickenbacher Is Back from Europe

Racer Ends Search for Speed Cars with Sunbeam Prospects

CHICAGO, Feb. 23—Prospects for the addition of two, and perhaps three, six-cylinder Sunbeams to the field of racers in America for the 1917 speed season are bright, provided, of course, that this country does not become actually involved in the war. This is the message brought back by Eddie Rickenbacher, who has just returned from Europe and is now on his way to the Coast to report to William Weightman, III, the millionaire sportsman of California.

In Europe Two Months

Rickenbacher has been in Europe for the last two months to arrange for the importation of one or more of the foreign cars for Weightman's stable and at the same time was commissioned by the Indianapolis speedway management to interest such European talent as might not be needed for the military operations in bringing cars over for the 1917 speed contests on this side.

If the proper arrangement can be made, the three Sunbeams will be on hand, possibly with Christinens in charge. If the Sunbeam driver finds it impossible to come to this country, Rickenbacher probably will be in charge of the Weightman importations.

The Swiss pilot is silent as to maximum speed figures but declares the new English cars will open American eyes. The engines will embody all the features that plants the dominating factor in English have made the Sunbeam aviation power military and naval aviation. Possibilities of 120 m.p.h. are hinted.

Had Movie Type Trip

Rickenbacher arrived in America from Liverpool on the "New York" after a series of adventures that would make an excellent plot for a movie thriller. As reported in *MOTOR AGE*, he was not permitted to land for several hours on arrival at Liverpool in December, as ostensibly there was something wrong with his passports. After being stripped and searched and delayed a long while he was allowed to go to a hotel for Christmas, where through the good offices of Chas-sagne, now in charge of Sunbeam aviation engines in Paris, and Louis Coatelen, managing director of the Sunbeam works, he was permitted to go. Though technically at liberty he soon found that he was under constant surveillance with two Scotland Yard men on his trail all the time. In London he was informed by the authorities that his appearance corresponded with that of a German spy expected on the same boat. After crossing the Channel to visit the Peugeot factory he was turned back

at Bordeaux and had to return to London. At Wolverhampton, Feb. 3, he learned of the severance of diplomatic relations between America and Germany and that the only boat he could hope to get away on left Liverpool, 156 miles away, in less than 4 hrs. With Coatelen at the wheel of one of the Sunbeam racers they caught the "New York" with 2 mins. to spare.

As a fitting close to the experiences of an American race driver in Europe, it must be recorded that during the first day out, a stowaway spy was hauled out of the coal bunkers; also, that the menacing eye of a submarine was sighted.

PEERLESS PRICES HIGHER

New York, Feb. 24—The Peerless Motor Car Co., Cleveland, Ohio, will raise its prices Feb. 28. The touring car and roadster, selling at \$1,890, will be \$1,980; the sedan, now \$2,750, will be \$2,840; and the limousine will rise in price from \$3,260 to \$3,350. The sporting roadster and the coupe will remain at their present prices.

DEALERS DODGE EMBARGO

Kenosha, Wis., Feb. 24—Trucks are being shipped by express and driven overland from the factory of the Nash Motors Co. to fill orders already delayed by the embargo in the East. L. A. Leathers, dealer in Brookville, Pa., ordered two Quad units during the New York show, and they finally had to be shipped by express. L. G. Martin & Son, Pittsburgh dealers, are planning to use express also. Jones & Saxton, Youngstown, Ohio, have been driving from the factory, as has the Flint Auto Co., Flint, Mich.

Detroit, Feb. 24—Not a day passes but long strings of Studebakers leave the factory by the overland route for distant cities. Studebaker dealers within a radius of 400 and 500 miles of Detroit are using this method to obtain their 1917 allotment. Even cattle cars, gondolas and flat cars, for a while available for railroad shipments, have been tied up by the coal shortage and other necessities.

DAYTON GOT 9-CENT GAS

Dayton, Ohio, Feb. 26—The city of Dayton is rather fortunate in the purchase of the gasoline supply for the various departments of the city government, but not as much so as was reported in public print as coming from Clinton Rogers Woodruff, in a speech made before the Commerce club of St. Joseph, Mo. It was reported that Dayton had a contract for five years for gasoline at 9 cents per gallon.

According to H. M. Waite, city man-

ager, the city did have a contract with the Standard Oil Co. for one year at 9 cents per gallon. That contract expired in August, 1916. During the year, however, the city of Dayton saved thousands of dollars because of the contract as gasoline sold at 23 cents for a portion of the year and at all times was considerably above the contract price.

Since the expiration of the contract the city has been buying its supply at 2 cents below the market price as it varies from time to time.

FAGEOL CORRECTS REPORTS

Chicago, Feb. 26—Reports that the Fageol car is to be manufactured in New York are called premature by President Fageol. Plans for locating the factory in the East, however, are under consideration.

RIVER TO RELIEVE CONGESTION

Kansas City, Mo., Feb. 26—Navigation of the Missouri river by the Kansas City company opens March 1 and this, it is confidently expected, will provide some relief from freight congestion. Last year there were many shipments of motor cars by boat; and many tourists, deprived of their summer outing on the ocean, took the Missouri river trip—and probably many by water elsewhere too—their machines being carried on the same boat. The largest volume of business by the boat line touching the motor industry, however, is in tires and accessories, of which several hundred thousand dollars' worth were carried last season. The boat service will doubtless aid in this distribution the coming season quite as materially.

BEN HUR TO EXPAND

Cleveland, Ohio, Feb. 23—The Ben Hur Motor Co. will hold a meeting of stockholders here in March to vote on a proposed capital stock increase. The company is now capitalized for \$1,000,000 and will increase it to \$6,000,000.

One structure, erected by the company at Willoughby, Ohio, 400 ft. by 150 ft. with 2 stories of office space and 66,000 sq. ft. of floor space, has been occupied for 20 days and is nearing general completion. A cement floor in the factory section has been delayed by the weather. If this can be laid soon the company hopes to be started within 60 days.

Between thirty and forty cars have been shipped, and plans are for from five to ten cars a week for the time being, as it is hard to get bodies. The concern has a capacity for twenty cars a day in the one structure and will erect two more buildings with 240,000 sq. ft. of floor space soon, which will increase the capacity to more than 100 cars a day. Contracts have been made for materials for 3000 cars and the company hopes to purchase a body and an engine plant to make its own bodies and engines, if the present shortage is not overcome otherwise.

operation. Prospective customers having a used car to offer for part payment would have been referred to the clearing house, which would have appraised its value and paid a schedule price in the form of a certificate. This paper would have been honored at face value by any dealer, and the dealer would have been able to realize 100 cents on the dollar from the clearing house.

PACKARD SALES RACE FAST

Chicago, Feb. 27—Many unique features characterize the selling campaign now being conducted by the Packard Motor Car Co. Each salesman entering the Lincoln Highway Sweepstakes race, as it is called, is known as the driver of car No. 130 or as the case may be. He then chooses a mechanic to ride with him. This man is some one connected with the organization who is to give the driver his support wherever possible. A record of the salesman's standing is kept on a large map of the United States showing the course of the Lincoln highway. For example, when a man has sold one or two cars his percentage of quota is shown on the map.

The same is true of the branch offices, whose standings are shown on the upper part of the map. There is much rivalry between these different branches and already Philadelphia has challenged Chicago and New York branches to an inside triangular contest, based on the percentage of quota. The loser is to give a dinner at Atlantic City to the heads, assistant heads and sales managers of the three companies.

Many branches are editing special bulletins to their salesmen to stimulate and encourage them. In addition, every bit of news or information pertaining to the contest is placed in the salesman's hands and is already having its effect. In addition to the prizes which the Packard company itself is awarding, the local branches also are offering other cash prizes.

STANDARD BUYS BOCK BEARING

Cleveland, Ohio, Feb. 24—The Standard Parts Corp. of this city, the consolidation of the Perfection Spring Co. and the Standard Welding Co. of which Christian Girl is president, has purchased the Bock Bearing Co., Toledo. The purchase involves \$2,000,000 of which payment was made by part cash and the balance by stock of the Standard Parts Corp. The Bock plant will remain in Toledo and W. E. Bock will remain with the company.

Owners of more than 50 per cent of the Bock Bearing Co. consented to the sale of that concern to the Standard Parts Co. at a basis of about \$151.60 per share. The Bock company is capitalized at \$1,200,000 common stock and \$450,000 preferred.

The Bock Bearing Co. was organized by W. E. Bock in July, 1913, and manufactures a tapered roller bearing. It is planned to turn out bearings for 350,000 cars in the plant this year, and production will be increased from 2000 to 10,000 a day.

Are We Ready for War, He Asks

Speaker at Philadelphia Compares American and European Invention Fostership

PHILADELPHIA, Pa., Feb. 21—"The Automotive in War," the subject of Joseph A. Steinmetz's talk at to-night's meeting of the Pennsylvania section of the S. A. E., proved not only pertinent but convincing as regards the lack of co-operation between the government and the citizen in the invention of instruments for defense or offense in war.

Mr. Steinmetz, who is the designer of the Jannay, Steinmetz Co., this city, has collected a most complete set of illustrations showing the fighting machines produced by the ingenuity of Europe. He advocates that the engineers of the United States get together in groups to discuss preparedness, that is, the design of trucks, etc., for use in war. He compared the European method of fostering invention and ideas by financial help with that of the United States Government wherein each individual must see his own ideas and inventions through by his own finances.

Civilians Design Armored Cars

Europe has about 100,000 armored cars, many of which were designed by civilians. Ideas have been worked out successfully by the European governments. For instance, one of the belligerent countries is now working on an aeroplane with invisible planes, the material in the planes being a special preparation containing the strength and rigidity of the canvas now in use and being transparent. Another suggestion, and by the way, by an American, is floats on the German dirigibles for use on the water.

Mr. Steinmetz deplored the present apathy on the part of the American toward preparedness. The United States has an organized army of 236,000, with a total of 20,538,347 available. More enlistments should be made and more thought should be given in regard to what would really happen should war be declared, according to Mr. Steinmetz.

Is our ambulance corps ready? Have we enough of these for actual warfare? Our armored trucks, what of them? How do our few compare with Europe's 100,000? Our aeroplanes, have they the proper protection from gunfire? Can they go on long reconnoitering trips, and are they fitted with the right guns? These are some of his questions.

An idea of what the engineers in Europe have accomplished was shown on the lantern slides during the talk. All ambulances and motor driven vehicles have wire wheels to minimize the damage to spokes during shell fire. The armored trucks and tanks have been successful through their complete armor protection, and the aeroplanes have played a prominent part. The English practically has solved the dir-

igible menace in London by aerial trawlers, or bombs, hanging from aeroplanes. When a dirigible is sighted the trawler is let out on a long wire and the aeroplane swoops down on the dirigible so the trawler hits the dirigible and explodes, thus destroying the dirigible.

TO FINANCE TIME PAYMENTS

New York, Feb. 24—The financing of the purchase of commercial vehicles and passenger cars upon the time-payment plan is included in the scope of the Commonwealth Finance Corp., incorporated under the laws of South Dakota with a capital of \$10,000,000, 7 per cent cumulative preferred and \$7,500,000 common. The fiscal agent is Sargent & Co., Minneapolis, Minn. An office will be opened in this city.

According to the plans of the company, it will purchase from responsible dealers deferred-payment paper on sold cars. Such paper, carrying the endorsement of the dealers, together with that of the company, readily can be resold at a profit.

Purchasers of cars also will be financed, the security being a mortgage upon the car itself or a contract whereby the title to the car remains in the name of the Commonwealth corporation until the last payment is made, together with an insurance policy covering fire and theft. The margin of security will be ample, as the company purposes to accept deals only on terms where the amount outstanding on deferred payments is fully covered by the forced-sale value of the car.

CASE PLOW NOT TRACTOR MAKER

The tractor operating a threshing outfit as illustrated on page 6, issue of Feb. 22, is the Wallis tractor made by the Wallis Tractor Co., Racine, Wis. The J. I. Case Plow Works is the selling agent for the tractor, not the manufacturer of it.

GOODYEAR CORDS AT SHOW

In making a census of the number of cars equipped with Goodyear cords, at the Chicago show, the number was given as five. This did not include the electrics so equipped of which there were three, and as two or three of the exhibits were not complete at the time the census was taken, information was taken from those in charge of exhibits as to what was coming. This did not tally with what was actually shown, hence the showing as reported for the Goodyear cords was not in accordance with the real facts. There were Goodyear cords shown on eleven makes of cars, which was a material increase over the preceding exhibition.

LAUNCHES IOWA BUYING

Des Moines Show Demonstrates Possibilities in Territory

DES MOINES, Iowa, Feb. 24—Iowa's greatest year for the buying of motor cars was off with a flying start at the eighth annual Des Moines show, which closed to-day. Sixty-five cars, including three electrics, were shown, and there were nine accessory exhibits. The first annual Des Moines motor truck show, held at the same time, helped to draw dealers from every county of the state and swell the attendance to an estimated 40,000 as compared with 32,000 in 1916.

Unparalleled Prosperity Basis

Iowa bought 52,941 cars in 1916. At an average price of \$800 per car, which is considered a fair average for a state of prosperous farm buyers, the state's 1916 bill for new cars was \$41,600,000. Iowa will buy 25 per cent more cars this year than last, according to the dealers and bankers. This will mean a total of 66,176 cars to be bought in the state during the year. Dealers and bankers say that the estimated number will not even supply the farmers of the state who are prospects.

Unparalleled prosperity in Iowa is the basis of the estimates for 1917 business. The Des Moines situation is shown by the increase in bank clearings from \$281,949,456.94 for 1915 to \$332,604,545.86 for 1916 and a proportionately greater increase already registered for 1917 as compared with the first part of 1916.

Agriculture is the basis of Des Moines and Iowa prosperity, and Iowa corn is the yellow gold that buys the motor cars. At prevailing prices a 20-acre field of corn—and that is a mighty small field in Iowa—producing 50 bu. to the acre, will buy one copy of the most numerous car in America with enough money left over for a starter and other fixings.

Iowa Has the Price

Iowa has the money to pay for the 66,000 cars she is scheduled to buy this year. The amount is only a small part of the wealth derived from the crops of last year. The Iowa Weather and Crop Service gives \$597,165,673 as the total value of Iowa farm crops in 1916 as compared with \$414,379,000 in 1915. If the state could buy 53,000 cars on the strength of the 1915 crop, is an increase of 25 per cent enough to be expected in face of a \$200,000,000 increase in the value of farm crops?

Iowa led all states last year in the production of corn and oats and in the number and value of horses, hogs and combined livestock. The yield of corn for the year was 366,825,000 bu., valued at \$293,460,000, as compared with a yield in 1915 of 298,

500,000 bu., valued at \$152,235,000. The increase in value of the corn crop alone, \$141,000,000, would be enough to buy 150,000 cars at \$800.

Price Offset Wheat Decrease

With a decrease of 8,000,000 bu. in the wheat yield the farmers still received as much for their 1916 crops as for their crop of 1915. The oat crop brought \$26,000,000 more in 1916 than in 1915, with a total yield of 186,000,000 bu.

Iowa ranks second in the United States in the production of hay, in the number and value of beef cattle, in the value of farm buildings and farm property and in the area of improved land. The state ranks third in the number and value of dairy cattle and of poultry.

Adding the value of dairy and poultry products to the value of field crops the total income of the farmers of the state for 1916 was \$75,000,000. The Iowa farmer never enjoyed a more prosperous year than 1916. Never before did the value of his field crops pass the half billion mark. His daily revenue was more than \$1,500,000.

Two elements entered into the making of a great year for the state in 1916. The first was the spirit of the Iowa farmer to strive for greater yields per acre each year. The second was the increase in prices. While his production was increasing the prices were advancing. The price per bushel of corn in Iowa on Dec. 1, 1916, is given by the United States Department of Agriculture as 80 cents compared with 51 cents a year before. The wheat of Iowa farmers advanced in price from 87 cents to \$1.56 in the same time; his rye from 80 cents to \$1.15; his flaxseed from \$1.50 to \$2.15; his oats from 32 to 48 cents; his buckwheat from 80 cents to \$1.25; his hay from \$8.70 to \$9; his potatoes from 54 cents to \$1.55; his barley from 49 cents to 91 cents; and his sweet potatoes from \$1.08 to \$1.92.

Stock Increased During Year

The same is true of livestock in Iowa. Milk cattle increased 14,000 in number for

SHAKEN BY BLAST

Toledo, Ohio, Feb. 24 — Thirteen men were injured by an explosion of gas in the Willys-Overland plant yesterday. There was a damage of \$25,000 caused by the explosion, which resulted from an accumulation of gas in an enameling oven.

Agriculture Creates Demand

the year, and their value increased \$1.50 a head, while the number of beef cattle increased 54,000 in number and 80 cents a head in value. The number of sheep increased 25,000; their value 70 cents a head. The number of hogs increased 1,349,000 during the year.

Thus we see that Iowans have the necessary money to buy 66,000 cars this year. Who will do the buying? With 198,000 cars in the state there is one car to every two and one-half families in the state as compared with one to every seven families for the nation. Is the state of Iowa near the limit of its capacity? Dealers and most bankers say no. Dealers, especially those who do business in the smaller cities and towns, report countless good prospects among farmers, retired farmers and merchants. Many Des Moines distributors say they are doing practically all their business in the country and the small towns and that there is no apparent diminution in the number of prospects. Those dealers who sell to the city trade are fully as optimistic. The reason is that there is no car-buying class. Prospective owners can be counted through the entire social scale. A Des Moines banker says his favorite waiter drives a car—and in spite of the Iowa anti-tipping law. A Des Moines dealer goes him one better and says he knows several waiters who are owners. A large percentage of the mechanical employees on one of the local daily newspapers are car owners.

Demand for New Cars

Moreover, it is pointed out that many of the older Iowa cars are going into the discard and that there is a big and constant demand for new cars to take the places of those which were new in the years gone by. This process of replacement is in constant progress and the replacements will grow in number with the passing years. The following table shows the wonderful motor car growth of Iowa since 1910:

Year	Number	Year's Increase
1911	27,988	16,190
1912	44,188	25,880
1913	70,088	38,019
1914	106,087	39,022
1915	145,109	52,941
1916	198,050	

In the face of such steady growth the estimate of 66,000 cars for 1917 seems moderate. It seems more so when one looks at the Des Moines show crowds and sees the hundreds of farmers coming to Des Moines from all parts of the state to get an

early look at the 1917 models. Their pockets are literally bulging with money as a result of last year's crops, and a greater percentage of medium and high-priced cars will be sold in the state this year as a result.

Iowa has no war brides in the shape of munition factories, but the war time prices for farm products have had the same effect and the farmers of the state have made so much money that they are in the market for thousands of cars. The motor car seems to be the one great Iowa luxury. The car has entered greatly into the life of Iowa, both in the city and the country, but especially in the latter. It has come to be the greatest influence in the state to better the conditions of farm life. The farm is isolated no longer. The distance to town has been annihilated. The farmers and their wives can now go to town for the band concert almost any night, and neighborly visits are easy. It is believed the effect will be to increase the farm population in Iowa and bring about an end to the emigration of Iowa farmers to other states and keep a larger number of Iowa farmers on their farms.

SAVANNAH GASOLINE SOARS

Savannah, Ga., Feb. 23—The price of gasoline in Savannah has advanced from 22 cents wholesale to 23 cents, and the retail price has gone to 26 cents.

This is the highest gasoline has been in Savannah, and dealers predict that it will not stop here. Various causes for the rise in price are given, among them being the shortage in cars and tonnage, the tremendous amount being shipped abroad to the Allied armies, the drying up of several important wells in the West and the consequent falling off in production of crude oil.

Last spring and summer the price of gasoline soared to 22 and 23 cents, though several dealers in the city continued to sell it to the retail trade at wholesale price, making no profit. At that Savannah had a much cheaper gasoline than other cities, due, it is said, to this being a distributing point for the entire state, the Standard Oil tankers coming here direct from the Texas and Louisiana oil fields. While gasoline was selling at 19 cents in Savannah, St. Louis, Chicago and other cities were paying 26 to 27 cents. Following the rise in price a Federal gasoline probe came and the price dropped a cent or two at the time. Now it has commenced to rise again.

ORGANIZES TRACTOR COMPANY

Tampa, Fla., Feb. 24—R. E. Olds, president of the Reo Motor Co., Lansing, Mich., will organize a \$1,000,000 corporation to manufacture farm tractors on a site between Tampa and Oldsmar, the new city which Mr. Olds is creating at the head of Tampa Bay. The plant will employ 500 men at the start and will build for southern trade in particular.

St. Louis Now in Circuit Fourth City Displays 340 Cars at Its Earlier Exhibition

ST. LOUIS, Mo., Feb. 24—Though this is the tenth annual show for St. Louis, it is the first one that has been held as a part of the show circuit. Former shows have been held in the fall during the Veiled Prophet week.

The exhibition is a large one. There are sixty-one car exhibits, fifty-six accessory exhibits and thirty-five truck exhibits. Three hundred and forty cars were shown. Seventy-seven were closed cars, ninety-five touring, sixty roadsters, twenty-three chassis, thirteen electric and seventy-two trucks.

15,000 at First Night

More than 15,000 attended the first night. But that was "wishers" night, and passes were in the majority among the tickets taken in. Each exhibit space drew fifty passes for the opening night, 12,000 in all being given. For the rest of the week there were no passes. Admission was by 50 cents or a special pass from the manager only.

The decorations were simple and served to hide the commercial appearance of the building, which is the new Overland building, six-story, with 132,500 sq. ft. of floor space and every floor in use for exhibits. The columns, door casings and side walls were covered with simlax.

More than 1200 dealers from thirteen different states registered Tuesday at the manager's office. St. Louis shows also are merchandising shows, and for this reason the dealers were very active during the week.

There was much interest in the police exhibit. The show committee realized that most of the traffic trouble was the result of misunderstanding, and they invited the Safety First squad of the police department to give a traffic exhibit.

Photographs, postcards, diagrams and literature helped the traffic officers explain the points of St. Louis traffic. It was common ground. Drivers from the country and drivers from the city wanted to know, and the officers were there to tell them.

The show is given under the auspices of the St. Louis Automobile Manufacturers and Dealers Association, of which F. W. A. Vesper, Vesper-Buick Automobile Co., is president. The committee consists of Joseph A. Schlecht, chairman; H. W. Spalding, vice chairman; and James D. Cathey, W. L. Johnson and W. S. Roberts.

70,000 AT ST. LOUIS SHOW

St. Louis, Mo., Feb. 26—The turnstile count at the show last week and the dealers' entrance showed an attendance of

more than 70,000 persons. Employees were admitted through another door and are not included this count. So were daily newspaper reporters and others who held season tickets. The registration of dealers shows that 6500 came here from twelve states—Missouri, Kansas, Oklahoma, Illinois, Indiana, Kentucky, Tennessee, Texas, Arkansas, Louisiana, Mississippi and Alabama. General manager Robert E. Lee said that 8000 persons were in the building when the curtain was rung down.

GUARANTY BANK ESTABLISHED

Chicago, Feb. 24—The Guaranty Securities Corp., New York, has made arrangements whereby the Guaranty Banking Corp. will act as its middle-western correspondent after March 1. This means that the Guaranty Banking Corp. will operate the plan of financing pleasure car and truck dealers' time payment sales and purchases in the Middle West and Rocky Mountain states. The concern will be located in Chicago. It has been incorporated as a state bank and is expected to do a regular banking business also. The officers of the Guaranty Banking Corp. are: President, E. S. Maddock; vice-president, Paul Fitzpatrick and Howard L. Wynegar; cashier, Joseph M. Eberhardt; assistant cashier, L. Stanley Coyle; and auditor, Fred A. Franklin.

RECEIVER DOES DOUBLE DUTY

Alliance, Ohio, Feb. 26—Attorney H. C. Koehler has been appointed receiver for the Alliance Rubber Co., and the Alliance Tire and Rubber Co. The appointment was made by Judge Day. A bond was fixed at \$5,000 which was furnished by Attorney Koehler and approved by the court. A selection of appraisers has not been made and no estimate of assets and liabilities made, but this will be forthcoming within a few days.

The work of the receiver will be a task as there are two distinct companies, and yet one. The first company was organized in March, 1913, with a capital of \$58,000. This was the Alliance Rubber Co. In 1916, through the efforts of some of the members of the company a re-incorporation under the laws of Delaware was effected and the capital increased to \$2,500,000, and the name changed to that of the Alliance Tire and Rubber Co. There is a merger of the first company, into the second company in a certain sense, but the old company affairs were never closed up and hence it is, in a way, existing to-day and the receiver must take cognizance of this fact.

Newly Drawn Bill

REGULATES STATE TRAFFIC

Proposed Texas Law Covers the Motor Case Thoroughly

EDITOR'S NOTE—At the time *Motor Age* inaugurated its traffic campaign it was suggested that many of the fundamental phases of traffic regulation well might be made state instead of municipal laws and this would be a big step toward uniformity of regulations within states, at least. Texas will have, if the bill before the present legislature passes, what appears to be a most comprehensive state traffic regulation;

one that leaves little for municipalities to do in the way of governing the movement of traffic except to enforce the state law. Of course, there are certain individual problems that always will be for local solution, but Texas is to be commended for the initiative shown in its present movement for better and more sane traffic rules that will be uniform throughout the state.

AUSTIN, Tex., Feb. 26—R. L. Carlock of Fort Worth is the author of a bill covering practically the entire motor regulation situation, which he has introduced in the State Legislature. This measure has been favorably reported by the House committee on State Affairs and its final passage by both branches of the law-making body is said to be practically assured. The bill as it was drawn meets the views of the motor vehicle owners, the municipal and state authorities and the general public, it is claimed.

Would Index Registration

The Carlock bill provides that all applications for the registering of motor vehicles, accompanied by the fee required by law, shall be sent to the state highway department and that these registrations shall be properly indexed with the name, residence and business address of the owner. On or before Feb. 1 of each succeeding year after August, 1917, the department shall supply each county clerk and chief of police with a list of all vehicles registered from their respective counties and towns. The license number plate of each vehicle shall be displayed upon the front and back of the vehicle.

Upon each vehicle there shall also be conspicuously displayed on the front end the seal assigned to it by the highway department. Each vehicle shall be equipped with a bell, gong, horn, whistle or other device and these shall be sounded to the rider or drivers of other vehicles and persons leaving or entering street or interurban cars. At night two lighted lamps whose lights must be visible at least 500 ft. in front, shall be carried, and at the rear a lighted lamp exhibiting a red light, visible for a distance of 500 ft. to the rear is required. A lamp must also be carried at the left side. The number plate carried in the rear must be illuminated by a white light so it can be seen for not less than a distance of 50 ft. The permanent dimming of front lights is required. Each vehicle must be provided with adequate brakes, kept in good working order.

The muffler cut-out is prohibited within the limits of any incorporated city or town or on any public highway where the territory contingent thereto is closely built up.

No one who is intoxicated shall drive one of these vehicles and no one is allowed to drive without the consent of the owner.

All chauffeurs must be licensed.

When the car is standing, the brake must be on.

The passing of motor vehicles is strictly regulated. Before crossing a railroad or interurban line at grade, every motor car must come to a full stop within 15 ft. of the track unless there is a flagman or guard at the crossing to show the way is clear. When a person is struck by a motor vehicle the driver and all persons in it must stop and give assistance to the one so injured. Any violation of this section is punishable by imprisonment in the state penitentiary not to exceed five years or in the county jail not exceeding one year or by fine not exceeding \$5,000, or by both such fine and imprisonment.

All speeding is prohibited on the public highways. No vehicle shall be driven at a rate of speed in excess of 30 miles an hour in the open country and not exceeding 18 miles an hour where the country is closely built up and not exceeding 15 miles an hour in any town or incorporated city, nor greater than 8 miles an hour where the traffic is dense or crossing intersecting streets or approaching a bridge, dam, trestle, causeway, viaduct or in going around corners.

Term Vehicle Is Broad

One of the important features of the bill is that which provides a complete set of traffic regulations for the purpose of that particular section and its subdivisions. The term vehicle is made to include every draft or riding animal whether ridden or led with the exception that an animal or animals attached to any conveyance shall constitute a vehicle. The provisions regulating traffic are as follows:

"Vehicles proceeding in opposite directions shall pass each other to the right, each giving to the other one-half of the road as nearly as possible.

"Vehicles overtaking other vehicles proceeding in the same direction, shall pass to the left thereof and shall not again drive to the right until the road is reasonably clear of such overtaken vehicle.

"It shall be the duty of the driver, rider,

or operator of a vehicle about to be overtaken and passed to give way to the right in favor of the overtaking vehicle on suitable and audible signal, given by or on behalf of the operator, driver or other person in charge and control of such overtaking vehicle, if such overtaking vehicle be a motor vehicle.

"Excepting where controlled by such traffic ordinances or regulations enacted by local authorities, as are permitted under this act, the operator of a vehicle approaching an intersection on the public highway shall yield the right-of-way to a vehicle approaching such intersection from the right of such first named vehicle.

In Regard to Signals

"It shall be the duty of the person operating or in charge of an overtaking vehicle to sound audible and suitable signal before passing a vehicle proceeding in the same direction.

"All vehicles approaching an intersection of the public highway with the intention of turning thereat, shall, in turning to the right, keep to the right of the center of such intersection and in turning to the left shall run beyond the center of such intersection, passing to the right before turning such vehicle to the left.

"In passing and overtaking, such assistance shall be given by the occupants of each vehicle respectively to the other as the circumstances shall reasonably demand in order to obtain clearance and avoid accident.

Precaution Is Made Obligation

"Every person having control or charge of any motor vehicle or other vehicle upon any public highway and approaching any vehicle drawn by horse or horses, or any horse upon which any person is riding, shall operate, manage and control such motor vehicle or other vehicle in such manner as to exercise every reasonable precaution to prevent the frightening of any such horse or horses and to insure the safety of any person riding or driving the same; and if such horse or horses appear frightened, the person in control of such motor vehicle or other vehicle, shall reduce its speed, and if requested by signal of the hand, or otherwise by the driver or rider of such horse or horses, shall not proceed

farther toward such animal or animals unless such movement be necessary to avoid injury or accident, until such animal or animals shall be under the control of the rider or driver thereof.

"The person in control of any vehicle moving slowly along upon any public highway shall keep such vehicle as closely as possible to the right hand boundary of the highway, allowing more swiftly moving vehicles reasonably free passage to the left.

"The person in charge of any vehicle in or upon any public highway, before turning, stopping or changing the course of such vehicle, shall see first that there is sufficient space for such movement to be made in safety, and if the movement or operation of other vehicles may reasonably be affected by such turning, stopping or changing of course, shall give plainly visible or audible signal to the person operating, driving or in charge of such vehicle of his intentions so to turn, stop or change said course.

"In passing any railroad, interurban or street car while passengers are alighting from or boarding the same, vehicles shall be operated with due care and caution so that the safety of such passengers shall be protected and for that purpose said vehicle shall be brought to a full stop, if reasonably necessary to obtain the object of this subdivision.

To Limit Coasting

"Every motor vehicle, when moving along such portions of the road where the curvature of the road or highway prevents a clear view for a distance ahead of 100 yards, shall be held under control and not permitted to coast, and the operator thereof in approaching curves or sharp turns in the road shall give a warning by his gong or other adequate signaling device.

"Police patrols, police ambulances, fire patrols, fire engines and fire apparatus in all cases while being operated as such, shall have the right-of-way with due regard to the safety of the public; provided that this provision shall not protect the driver or operator of any such vehicle of his employer or principal from the consequences of the arbitrary exercise of this right to the injury of another."

Local Powers Given

Besides the rates of speed that are fixed by the bill, the local authorities of cities and towns are also empowered to pass ordinances governing same. The bill further provides that upon the arrest of any person three times within 60 days for speeding or running a car when intoxicated he shall be prohibited from further operating a motor vehicle for a period of six months.

INTER-STATE CONTROLS BEAVER

Muncie, Ind., Feb. 26—The Inter State Motor Co. has taken complete control of the Beaver motor and will manufacture 10,000 cars this year. The 1917 production will represent an increase of 230 per cent over last year's output.

Canada May Have Cross-Country Road

Unemployment After War Is Used as Argument in Favor of Highway

VICTORIA, B. C., Feb. 23—At a recent meeting of the board of governors of the Island Automobile Association, held here, it was decided that the time had arrived vigorously to advocate the linking together of a continuous road across Canada from the Atlantic to the Pacific, to be known as the Canadian highway.

The plan of the Island Automobile Association is not to form an inter-provincial association to secure the required results, but simply to make a direct appeal to the various good roads and motor clubs, boards of trade, rotary clubs, farmers' institutes, trades and labor organizations, municipal councils, and provincial governments across Canada to do what they can to connect together the Canadian highway in their own province and locality, and also for these various bodies to urge upon the Federal Government the desirability of federal aid to the project.

Public Work Needed

The feeling that there may be considerable unemployment after the war and that it may be necessary to arrange for some public works to provide employment, is shared by some of Canada's leading statesmen. Hon. W. T. White, minister of finance, stated at Toronto some months ago: "After the war there will be a period of dislocation which the Government would bridge over by pressing vigorously public works." Similar utterances have been made by other public men. It is planned that this project will not conflict in any way with any good roads movements now in progress but rather to link it up with projects already in existence so that indirectly this whole plan can be carried out.

It has been suggested by the Island Association that it would be willing to support federal aid, provided in any of the following ways:

Proposed Federal Aids

1—The Federal Government to take certain difficult or isolated sections of the Canadian highway route, irrespective entirely of provincial boundaries, and construct the roads in those sections, and, upon completion, give these sections to the province where the work was done.

2—The Federal Government to undertake the entire work across Canada and its future maintenance and ownership. The various provincial and municipal authorities to turn over to the Dominion Government, free of charge, any existing roads that may be on the Canadian highway route.

3—The Federal Government to supply a lump sum of money for expending upon

the Canadian highway, to be given to and divided among the provinces in any of the following ways:

a—In proportion to the amount already expended by each Provincial Government on the Canadian highway.

b—In proportion to the difficulty and distance in each province of the unfinished portions of the Canadian highway.

c—In proportion to the customs duties collected on cars and car supplies in each province, 1905 to 1914 inclusive.

d—In proportion to the average amount spent by each Provincial Government, 1905 to 1914 inclusive, on all their roads.

GOODYEAR DEVELOPING COTTON

Chandler, Ariz., Feb. 24—The Goodyear Rubber Co., which purchased 8000 acres of raw desert land near here several months ago for a cotton plantation to produce the raw material that enters into the fabric of the tires they are making, etaoinshrd 11 of the tires they make, has made a wonderful transformation in the vast stretch of unsightly waste land. It is operating here under the name of the Southwestern Cotton Co. The clearing of the land of brush was begun about six weeks ago and the entire 8000 acres are now ready for planting. Power tractors are pulling the gang plows, which break the land to a depth of several inches. The tract is divided into four units of 2000 acres each. To provide water for irrigating the crop, twenty-seven wells have been sunk, each to a depth of about 40 ft.

WILL MAKE HANSON FLIER

Detroit, Feb. 24—G. W. Hanson of the Hanson Motor Co., Atlanta, Ga., the company which will manufacture the Hanson Flier, is now in Detroit working with Don Ferguson, consulting engineer of the company, who is completing the first model at the Puritan Machine Company plant.

TECHNICAL PUBLISHERS MERGE

New York, Feb. 27—Special telegram—Two of New York's large technical and engineering publishing companies have merged under the name of the McGraw-Hill Publishing Co. Under this title are included what was the McGraw Publishing Co. and the Hill Publishing Co. The McGraw Co. published the Electrical World, Engineering Record, Electrical Railway Journal, Electrical Merchandising, Metallurgical and Chemical Engineering and Contractor. The Hill company published American Machinist, Power, Engineering News, Engineering Mining World and Coal Age.

Manifold Importance Increased

Carbureter Experiments Show Necessity of Pre-Heating to Obtain True Vaporization

THE importance of the manifold has grown with the descent of the grade of fuel. For the carbureter has ceased to be more than a measuring device, while true vaporization has become a duty of the intake manifold.

The influence of heat was discussed formerly as to the absence or presence of advantages offered by it in assisting the evaporation of gasoline. Now it is recognized as a necessity. The engine builder fully realizes the problem in taking care of the gasolines of low volatility, and each year more elaborate means for pre-heating the mixtures are used.

Stromberg Carbureter Experiments

The Stromberg Motor Devices Co. in Chicago has made some interesting experiments in its laboratory recently to show the action of gasoline after it leaves the carbureter under different degrees of throttle opening. A glass bell has been arranged over the carbureter outlet so the suction of the engine falls on the jet in the usual manner but the resulting mixture is thrown into the glass bell before being drawn into the engine. With this apparatus it is possible to study results with different carbureters and with different forms of manifold.

It is only necessary to watch the action of the mixture as it enters the glass bell to see the condition in which the fuel is entering the engines. Superficially, it is possible to observe that at low throttle openings the evaporation is practically complete and the mixture is entering the engine in the form of fog. This seems to be true with all carbureters and certainly was the case with those which were tried out during a recent visit to the laboratory. As soon as the throttle was opened, however, and the vacuum began to drop, instead of a fog the resulting mixture resembled the play of a fountain with large globules of raw gasoline entering the manifold.

Here the influence of manifold form became immediately apparent. With bends and elbows the raw gasoline was immediately baffled and collected in pools which slowly dripped down the sides of the pipe or were carried gradually to the cylinders, depending on the shape of the manifold and the conditions.

Pre-heating Intake Manifold

The reasons for this are not far to seek as they are evident from the hygrometric conditions of the gasoline vapor. With the higher test fuels such as we were using two years ago, the engine worked above the dew point or point of saturation of the

Result of Low Grade Fuel

mixture of ordinary atmospheric temperatures. With the present-day fuel we are below the dew point under the vacuum existing at wide-open throttle, unless provisions are made to pre-heat the intake manifold. To show these conditions clearly, some tabular matter has been prepared in the Stromberg laboratory. There are two tables—one covering octane (C_8H_{18}) and the other, decane ($C_{10}H_{22}$). The fuel of to-day may be represented in its characteristics by decane, while that of some time ago is approached by octane.

In experimenting on decane, the report of the Stromberg laboratory states that decane is one of the main constituents of the more or less irregular blend of hydrocarbon elements now sold as gasoline. Its properties are typical because of the fact that its specific gravity is about that of the whole blend, 58 deg. Baume. In other words, it is midway in the range, there being as much lighter grade elements as of the heavier in 58 deg. gasoline.

As the fuel is normally discharged into the air from the nozzle in the form of drops or mist and must then be evaporated, there must be enough heat present to compensate for the drop in temperature which takes place during evaporation. For decane this requires about 43 deg. Fahr., so that in order to completely carburete the full charge of air, the entering air will have to have a temperature of about 152 deg. Fahr. in order that the mixture after evaporation should be 109 deg.

At any lower temperature it would not be possible to carburete a full charge of air so long as decane only was used, and the motor probably would run irregularly because the fuel in liquid form would run along the walls, puddle in all the straight passages or depressions in the manifold and go very unequally into the different cylinders.

Unvaporized Burns Incompletely

In the actual use of gasoline on a cold motor it is necessary to open the fuel jet and use enough more of the mixed fuel so that the deficiency in decane vapor and that of the heavier elements is made up from the lighter elements which vaporize more completely. The unvaporized portion of the heavier elements of course remains in the liquid form, travels to the motor very slowly along the walls, when it travels at all, distributes unevenly to the different cylinders and, when it is taken in, in the form of large drops, burns

incompletely and with a considerable deposit of carbon.

The only thing which makes it possible to use the present-day fuel is that the motors are usually so large for their work that 98 per cent of their operation takes place while the charge is greatly reduced by throttling. This decreases the amount of vapor charge necessary and thus lowers the temperature necessary to run. For instance, if the throttle of the carbureter were closed so that there was only 26 per cent of a full air charge per cylinder, a complete vapor charge could exist at 68 deg. Fahr., or with an air admission temperature of 111 deg. Fahr. and so on.

These conditions can be compared to those that would exist if we had fuel which averaged, in properties, octane. The octane tabulation shows that it is possible, at freezing point or 32. deg. Fahr., to have a vapor charge of 31.2 per cent at a ratio of 15.2 to 1. The percentage of vapor charge reaches 100 with the octane at less than 68 deg. With the decane, which represents the fuel of today, it requires about 106 deg. **Complete Vaporization Necessary**

Practically, this means nothing more than a proof of the necessity for preheating the manifold. The carbureter is seen with a fountain spray of large drops, which must be caught and evaporated in the intake manifold before they reach the cylinders. To get the proper distribution, complete vaporization is necessary, and the simple pre-heating of the intake air may not always fulfill the conditions. It must be remembered that there is a temperature drop during evaporation which robs some of the preheated air of its heat, and this must be made up in the intake manifold unless the initial air is heated to such an extent that a loss of volumetric efficiency occurs.

Where the entire matter will lead in the question of volumetric efficiency is something which cannot at present be foreseen. It seems quite certain that it will be impossible to use the same pre-heating arrangement for a car that is operating in a cold northern climate as for one in some of the southern states in summer. There is a difference in the atmospheric temperature of fully 100 deg. Fahr. and some compensation must be necessary if the same efficiency is to be secured in cold weather as in warm. It does not seem possible that a mean condition or construction will be satisfactory, and this means either thermostat control or placing the temperature regulations into the hands of the driver.

Currying Your Motor Car

From the Woman's Viewpoint

"HOW do you keep your car clean?"

Mrs. McCreery asked Mrs. Henlon. "I do it myself," said Mrs. Henlon, "that's how. Of course, I could send it down to the corner garage, but if I do that I naturally won't send it every time it needs cleaning, and besides I have found a way to clean the car without making myself a fit subject for a vacuum cleaner, too."

"How in the world do you do that? Why, I once tried to clean my car and I had to hibernate for a week or more. Even pumice stone couldn't take all the grease stains off my hands, though it did take most of the skin off. And as for my clothes——"

All in Knowing How

"My dear, you went at it wrong," laughed Mrs. Henlon indulgently, adding quickly when she saw that Mrs. McCreery was about to take offense, "I did the same thing the first time or two I tried to curry our car, and it was all because I didn't know how. Most of the success in anything is knowing how these days, and it's the same way with cleaning a car."

"Well, I just feel like I ought to be able to get out and clean the car myself, without being dependent on a lot of men who don't think nearly as much of the car as I do," regretted Mrs. McCreery.

"Can you blame them for not thinking as much of it as you do," said Mrs. Henlon. "Why, of course you can get your car thoroughly cleaned at any reputable garage, but unless you keep your car there at so much a month for cleaning and so on, your car is pretty apt to get mighty shabby in the intermissions between the garage acts."

"Well, what can a body do, anyway?" almost wailed Mrs. McCreery, for she was very ambitious to have her car be as bright as it was before she learned to drive it. She was somewhat afraid strangers might think she could drive no better than her car could look. Which wasn't the case at all, as it happened.

Good Job in Few Hours

"Well, it takes 4 or 5 hrs. to do the job well," began Mrs. Henlon. "I sometimes think I could spend a whole day just messing around the car, but if you go at it right and use a certain general plan it shouldn't take you anything like a day, not at all. Though, if you slight the job, you'll find that you have scratched or dulled the finish in the hurry of slighting."

"If it isn't too cold to use the hose outdoors on the car, so much the quicker, though plenty of warm water, changed frequently, works just as well in the long

run. You ought to have plenty of soft rags, a scrubbing brush, chamois, ivory soap and just lots of warm water, even if you do use the hose to get the most superfluous dirt off with. Then, of course there's the cleanser, sprayer and gasoline that go to making the cleaning easier.

To Get Caked Dirt Off

"You'll find that your running gear picks up the most of the road's dirt. At least it'll seem that way. This dirt should be soaked off, not knocked off, and it'll take some warm water to do it. The hose comes in handy here, as you can get a good deal of it off with the hose, and your fenders will be cleaner underneath also."

"No, I never worry about the spots and stains on the car until I've routed pretty nearly all the real dirt and dust. The hose won't take them off, no matter how hard you try. Just get all the top layers off, and use lots of soft rags to dry the body after it is washed. Be careful in drying, as the least little grain of sand, rubbed across by the rag, will leave a deep mark. Pat the car just like you would a baby."

"Now comes the cleanser. If you use a sprayer you need not get very dirty yourself, though my sister couldn't clean a car with a 6-ft. sprayer and not get dirty. You can use that soft, soapy cleanser that goes on with a cloth, but then you have to be careful about scratching again. Wipe the cleanser off with another soft cloth or chamois. The chamois is best, as you know from cleaning the piano with it."

Then It's Rub, Rub, Rub

"Well, next I go to polishing, and here's where you show what you're made of. The polish will go on with a sprayer, too, but that's just the preamble. You have to get it on evenly, which isn't so hard when you use a sprayer. Then, you begin to rub, and it's rub, rub, rub until you see mirages of wonderfully bright cars or your backbone buckles."

"Takes elbow grease, does it?" laughed Mrs. McCreery, who had been listening with all her senses to this impromptu lecture.

"Indeed and it does," said Mrs. Henlon promptly, "it's as bad as doing housework, but if you want to be proud of yourself, you'll keep on rubbing. If you wipe the dust off the car once in a while between these polishing-cleanings, you won't have to rub so much later, but if your car has gone through lots of weather and wear without any petting, elbow grease is the main story. When you get the polish on, all the results sit back and wait for the elbow grease to appear on the scene. The more you rub the better you will like the

finish of your car—after you get through.

"It isn't so bad as it sounds, though," Mrs. Henlon interrupted herself. "You really get through before you know it."

"Now, you don't want to put any grease on the top. Use ivory soap and water for that. The top's casing is very particular. If you use polish, chemicals or soap on it you are likely to ruin its rainproof qualities. You know what happens when some poor tenderfoot accidentally runs her hand along the tent roof or side. The curtains, top and slip covers all require particular care, though it isn't any more trouble to give them this care than it is to treat them wrongly."

Be Tender with Top

"Just run over the casing of the top with a damp cloth. Don't use any polish, chemicals or soap. You get the spots out of the slip covers with gasoline or benzine, much the same as from a skirt or coat, but you have to use the same care to lose none of the color. I clean out my car pockets, too, once in a while. You have no idea how much dust they can carry along with everything else they are stuffed with."

"How do you keep your car floor looking respectable?" asked Mrs. McCreery. "Mine sometimes comes back from a single trip looking as if it were weighed down with the discouragement of centuries, and nothing I do seems to help its spirits."

"Try a little turpentine," Mrs. Henlon advised. "There's nothing like it for helping the spirits, as you say, of the car floor. It will brighten the carpet up wonderfully."

"Do you have any trouble keeping your nickel fittings looking shiny?" asked Mrs. McCreery.

Works Like a Charm

"Well, not now, though I did at first," admitted Mrs. Henlon. "And when I did solve the problem it seemed too simple for any use. I just took some of the polish I use for my silver and tried that, and it worked so well I've been using it ever since. You don't have to rub any to speak of, and the nickel comes out just like brand new."

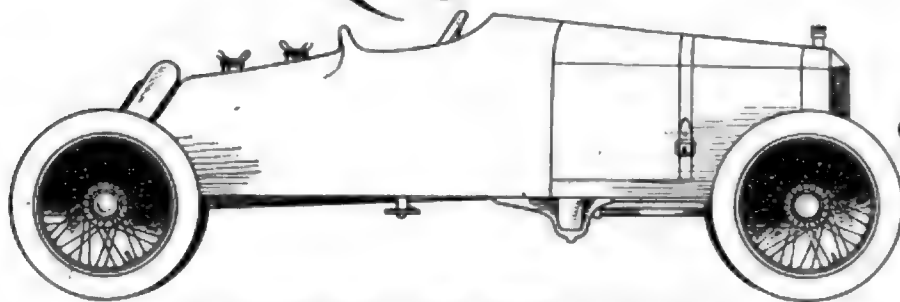
"How do you clean the windshield?" asked Mrs. McCreery.

"With my chamois," said Mrs. Henlon. "Of course you might use Bon Ami, if you want to, but I find chamois works just as well, and you are not likely to get any white from the Bon Ami on other parts of the car, where it sticks and is hard to remove."

"For myself, I'd rather rub a little more and use a chamois than have the black around the windshield come out grayish."

Making the Ford Car Fast

by E. B. Williams



The author's model of a Ford car that has been made fast

AS I have helped in rebuilding several Fords that turned out exceptionally fast for the money invested in the job, I believe that I have gained some experience that may be of value to others, so will set down what I have learned, and it may be taken for what it is worth.

There have been a few jobs turned out that ran into the thousands, you might say, and that were Fords in name only when finished. Of these I will have little to say, taking it for granted that what is wanted is something that is within the ordinary man's reach, both in a pecuniary way and, if he delights in doing his own work, in a mechanical way.

Two Parts to Work

The work naturally divides itself into two parts, the engine and chassis, or running gear. I will discuss the engine first, it being the most important part.

The engine, as it comes from the factory, has bored cylinders, and as it is impossible, especially in a commercial way, to bore a perfectly true cylinder, the first thing you should do is to have your cylinders re-ground by a competent machinist, one who makes a specialty of this sort of work. Then you have a set of cylinders that are in line, have equal bore all the way through and are as near round as it is possible to make them.

The pistons I have used were cast of aluminum alloy, of course, and were equipped with non-leaking rings. Whatever make is purchased, or if you have them made to order, see to the following things: There should be a rib or reinforced run from the piston-pin boss up to the piston head on the inside. Also several ribs should be cast across the inside of head. This both stiffens the piston and helps in carrying away the heat from the explosions. If you have the pistons made to order, it is advisable to have them cast and machined for two rings rather than three. This cuts down ring friction, lightens the part, and will hold compression as well as three or more rings if properly fitted. In fitting the pistons, plenty of clearance must be given—from .007 to .008 being about right. This may seem ex-

cessive, but remember that the expansion of aluminum is much greater than of cast iron.

This large clearance may lead to oil pumping and foul plugs, and so I have always turned and drilled an oil groove in each piston just below the lower ring groove as shown in Fig. 2. The grooves are about $\frac{1}{16}$ deep and $\frac{1}{16}$ wide, having the lower corner rounded off. There are eight $\frac{1}{8}$ -in. holes drilled through the groove at equal distances around the piston, slanting down toward the inside. The top corner of the ring that is fitted in the ring slot just above this groove should also be slightly rounded. As the piston goes up the rounded edge of the ring and the groove tend to slide over the film of oil on the cylinder wall, while in going down the sharp lower edge of the ring scrapes the oil in the grooves and it runs through the holes to the inside of the piston, and thus back to crankcase.

Lapping Rings to Fit

The rings should be of some good non-leaking type, or at least be step cut. Fit them in the cylinder with a gap of about

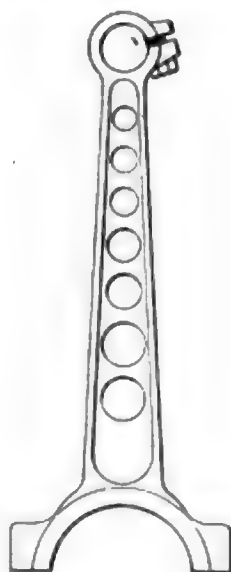


Fig. 1—The connecting rod has been lightened by dressing with file and drilling holes through inside web

.004, then lap them to a fit. In lapping them in, they should be placed on an old piston, cast iron is best, and worked back and forth in the cylinder, keeping the cylinder walls well covered with a mixture of exceedingly fine carborundum or some other abrasive and oil. As the piston is moved back and forth, also give it a slight rotating movement. I have used a tool similar to the one shown in Fig. 3 for this purpose. The wrist pin goes through the hole shown.

Job Repays Trouble

This is a long tedious job, but you will be well repaid if it is properly done. It takes from 1500 to 2000 miles to wear in a set of rings under running conditions. Be sure and get all the abrasive from the cylinder walls and rings after the lapping is finished, or it will continue after motor is set up.

You can lighten the connecting rods considerable by dressing them up with a file and drilling several holes through the inside web. This does not dangerously weaken them, judging from my experience. Do not drill any holes in the last inch toward the bottom, as this is where the most strain comes, and anyway this part of the rod is more of a rotating than a reciprocating mass. In one car the rods were chucked up and the lower ends turned out and bearings made of Kelly metal were cast, turned to fit and installed. After 2500 miles of driving, most of it at high speed, the motor was torn down and these bearings showed practically no wear. This metal, if used, must be fitted with plenty of clearance.

Large Valves Are Better

You will secure better results if the valve ports and pockets are turned out and larger valves used. No trouble is liable to be encountered in boring the seats and ports from the top, but when going in from the side the tool will sometimes break through, and you will have to have the hole welded. It is best to do this before regrinding the block, as the heat, if welding is necessary, will warp the walls surrounding the weld. The ports can be enlarged $\frac{1}{8}$ in. and this is necessary if you expect good results. I have used tungsten steel valves, giving the stems plenty of clearance.

The springs must be stiffened considerably, either by installing heavier springs, or by placing spacers between the upper

ends of springs and the cylinder casting.

It is good practice to install valve adjusters, using the kind that screws into the valve push rod, it being necessary to anneal, drill and tap the rod. While you are about it, drill the length of rod to the head, but not through. This lightens the part and cuts down inertia, thus helping the valves to close quicker.

At this stage we come to the camshaft, which should be of the high-speed type if you can afford it, several different makes being on the market. I have secured good results with shafts taken from Ford cars of 1912 or earlier vintage. You will find them considerably different from the new type. If the regular shafts are used do not try changing the timing, as one tooth on the coarse pitched timing gears of the Ford throws the timing out too much.

Necessary to Shorten These Screws

Leave out the magneto field coil assembly, and remove the magnets from the flywheel, screwing back the brass screws and brass magnet supports only. It will be necessary to shorten the screws a little. They will kick up almost as much oil as the magnets, and considerable drag will be removed.

Now see that the crankshaft is perfectly true, then assemble the crankshaft and gearset and try out in the lathe, first seeing that the bushing in the driving-plate assembly is a good fit on the gearset gear-shaft. If there is any wobble it will probably mean turning up both sides of the gearset-shaft flange and the back side of the crankshaft flange. Now reassemble and turn up the flywheel if necessary to make it run true. Take out the assembly and try on two perfectly level knife-edge testing bars for balance. If one side of flywheel turns down, take out material on that side until the wheel stays where you turn it. This may seem a lot of trouble, but it is essential that these parts be true and in perfect balance.

Gearset May Affect Bearings

The power and added strain at high engine speeds will sometimes cause the gearset to whip out the babbit bearing at the rear in what is called the front ball cap. This will in turn loosen up the rear main bearing. I have found it advisable to turn out the ball cap and equip it with a bronze bushing, fitting it rather loose on the gearset driving-plate assembly shaft to give lots of room for oil.

It is good practice to fit some auxiliary oiling system besides the gravity one with which the Ford is equipped. If money is no object a force feed system can be installed, which should have leads running to all four cylinders, being tapped through the walls on each side near the bottom of the cylinders and also a large lead running to the front of the crankcase. I have secured good results by cutting a $\frac{1}{8}$ hole near the top of the gearset case on the right side and running a piece of brass or steel tubing, also $\frac{1}{8}$, to empty into the

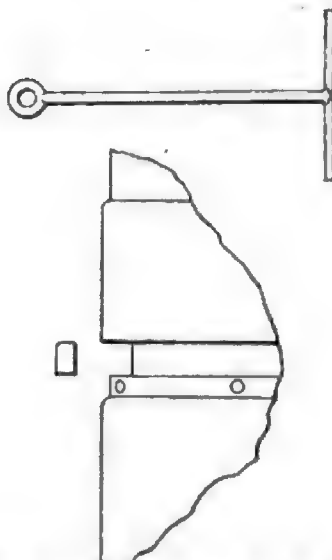


Fig. 2—The tool at the top can be used for lapping the pistons and rings. At the bottom is illustrated the preparation of piston and ring to prevent oil going into cylinder

timing-gear case as per Fig. 4. The front end need be only a snug fit in the case, but the rear end must have a flange which can be bolted to the gearset cover, using a gasket between. A sheet-iron partition can be installed just back of No. 4 cylinder. This can be made as high as it is desired to carry the oil level under the connecting rods. Of course every car intended for long distances should also have a hand oil pump convenient to the driver which will force oil from the reserve oil tank to the front of the engine.

High-Tension Magneto Discarded

While I believe a good high-tension magneto to be the best ignition on earth, I have discarded it in Ford work on account of the additional power needed for driving. Turning a magneto armature over at two or three thousand revolutions a minute requires more power than is generally thought, in my estimation. I have used a battery distributor system because it is light, is easily driven and works on the

open circuit idea, thus requiring only four or five dry cells for juice.

Some additional cooling is needed. I have found the large V honeycomb type of radiator to be best. You will find that it will probably be unnecessary to use a fan with one of these. If you are building a streamline body it will be better to have some radiator maker build one of the tall narrow kind to order, or you may purchase a stock radiator. If it is necessary to use the original radiator, have a good tinsmith build on an extra tank to the top, either back under the hood, or point it and extend it out in front. Anyway, the original equipment must be improved upon for fast work.

For carburetion I recommend a $1\frac{1}{4}$ -in. type, with a $1\frac{1}{4}$ -in. built-up steel-tubing manifold. The one illustrated in Fig. 5 has given good results. No cast manifold is efficient, as the rough surface inside, with possible fins and irregular turns, seriously hampers the flow of gas.

Air Pressure Necessary

Each end of intake manifold has a collar brazed or welded about $\frac{1}{4}$ in. from the end; also the exhaust pipes, which are of steel tubing and run straight out through the hood. A copper-asbestos gasket is slipped over the end of manifold and makes a tight fit between the collar and the cylinder casting. Manifolds are held on by crows' feet, which slip over the original studs and bear against the outside of the collars. It will be necessary to use air pressure on your gas supply as the carburetor should be set high, thus shortening the manifold.

When we come to the running gear we have two things to consider. If the car is to be used for fast track work only, by all means lower it. But if you want it for other work too, you will probably have to leave it up in the air, and sacrifice some efficiency.

The best way to lower the front end, to my notion, is to have a new axle made similar to the one illustrated. It may be either a forging or of cast steel. This

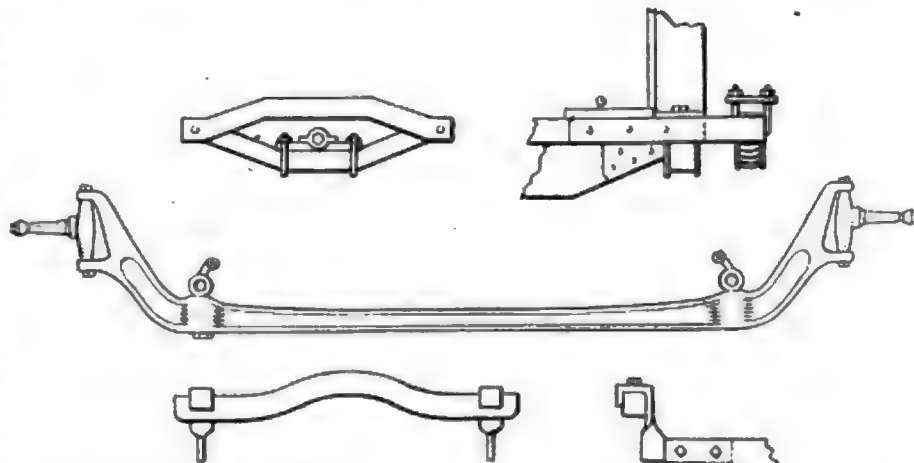


Fig. 3—Top—Method of lowering front end of frame by lengthening frame out and installing extra front cross member. Center—Dropped front axle. Bottom—Method of lowering rear end of frame 4 in.

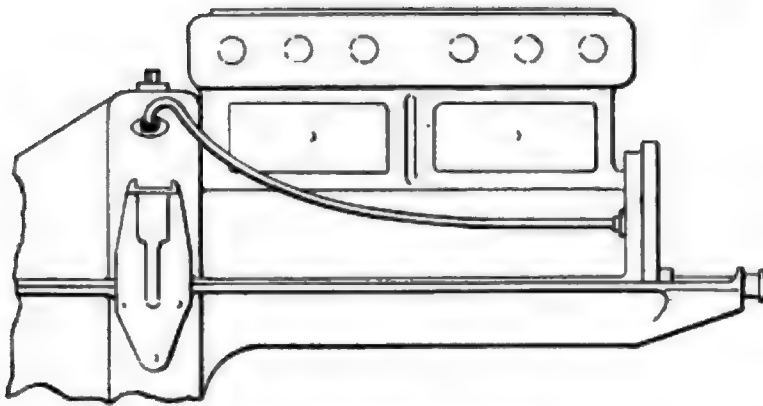


Fig. 4—One auxiliary oil system

leaves your frame strong and rigid, and an added advantage is that your radius rods are still in a straight line.

The rear end of the frame can be lowered by cutting off the side members just in front of the rear cross member and using steel forgings as shown in Fig. 3. The front end, if a cheaper construction is desired, may be lowered as shown in Fig. 3, by riveting pieces of channel iron on the sides of the frame, letting them stick out in front about 5 in. An extra cross member, similar to the regular Ford front cross member but with a high instead of a low center, is riveted across the front to the two new side extensions. This sets your front axle ahead enough to clear the radiator, and the amount of frame drop depends on the shape of your new cross member, as can readily be seen, which carries the spring. With this method it will be necessary to lengthen out your radius rods and the starting crank.

Assembly Should Be Kept Rigid

In tilting the steering post it is desirable to keep the assembly as rigid as possible. Have it bolted to the dash securely, blocking behind the dash plate with a wedge-shaped piece of hardwood shaped to fit the space caused by lowering. It will be necessary to drill a new hole in side of frame for bolting down the bracket. You can block under the bracket where it tips from the frame with steel washers before bolting.

The steering-gear connecting rod and the spindle-arm connecting rod should both be stiffened. An easy way to do this is to place a piece of small channel iron or steel tubing alongside the rod and bind the two together with several layers of tape, taping the whole length of rods, and then shellacing the whole job. This is cheap, easy to do, and makes a permanent job.

See that the axle tips toward the back of the car at the top. The nearer vertical the axle is set, the harder it is to steer, and when the top of the axle gets ahead of the bottom, it is almost impossible to keep the car in the road.

A good gear ratio for a car put up like this one about 2 4/7 to 1. While I have always made my own special gears, sev-

eral concerns are making and advertising them. Some makes sell for \$15.

While you have the rear end down see that the differential gears are a good fit on the inside ends of the axles. These sometimes get loose and tear the key seats out of the axles.

The rear hub brakes on the Ford were only intended for holding the car when standing still, and if used when running they do not last long, and are not very efficient at that. The best brakes I have used so far were secured from Los Angeles, Cal., costing \$16 per set. They have large drums and external contracting bands lined with Raybestos.

Be sure and see that the transmission bands are a perfect fit on the drums and are not adjusted too tight. They can set up quite a drag if not properly set.

Speed Thus Obtained

I had one of these cars do 63 m.p.h., and another one equipped with wire wheels 71. Of course, if economy is no object a new cylinder head with overhead valves and camshaft, wire wheels, etc., can be added, the stroke lengthened and in this way a few miles per hour gained, but for the man of moderate means the foregoing described car will go fast enough and furnish lots of pleasure in the building.

The job I have described will run from \$200 to \$350, depending on how much of the work the builder is able to do himself.

I have not taken up the construction of the body, as that depends upon the taste or ability of the man who is building the car, also upon the use to which it is to be put. For racing a pair of bucket seats and a gas and oil tank bolted to the frame will in

get by very well, but are not comfortable or very clean. The body shown in the illustration is good, being neat in appearance, can be made comfortable, and offers little resistance to the wind. While it is not drawn to scale, the proportions are near enough right to give the idea. There is a gas and oil tank in the rear compartment, with the spare being slung on the extreme rear. This body should cost you about \$150 at the average body builders.

Don't forget your hood straps, and have them very substantial.

MAKES TIRES IN STORE WINDOW

Detroit, Feb. 24—The B. F. Goodrich Co. has installed two complete machines for manufacture of cord tires in the window of its branch here and has factory workmen operating them.

REGISTERS MILLION DOLLARS

Boston, Mass., Feb. 28—It is estimated that the motor cars registered in Massachusetts last year reached a total valuation of \$100,000,000. With that as a basis and figuring that the rest of New England had about as many cars as the Bay State it would give a \$200,000,000 valuation for the cars.

Last year 257,538 cars were registered in New England for the fiscal year. That means a few more listed in December, for the year ends early in the month for most states, so returns may be made to the legislature. Of this total 40 per cent were Massachusetts machines.

The Bay State registered 117,895 machines. The other five had 139,743 machines. And when the 1915 figures are compared it shows an even growth in the registrations, for of the 197,230 cars listed that year 90,673 were Bay State cars. There was an increase in registrations for all New England of 61,308 machines, and Massachusetts had 27,122, or more than 40 per cent.

GRAMM-BERNSTEIN SALES ..

The Gramm-Bernstein Motor Truck Co., Lima, Ohio, retains the general marketing of Gramm-Bernstein trucks. The R. E. Taylor Corp. is distributor for New England, New York, Maryland, Delaware, District of Columbia and eastern half of Pennsylvania—not for the entire product of the factory as seemed to be inferred by an item in MOTOR AGE issue of Feb. 15.

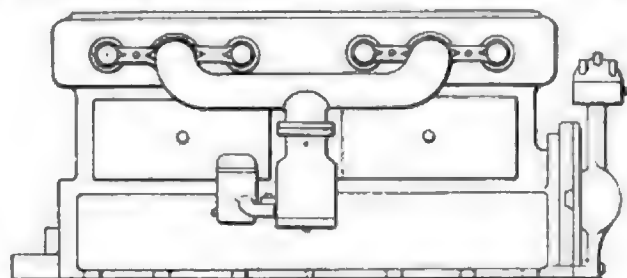


Fig. 5—Ford block showing installation of built-up manifold, carburetor and ignition apparatus



The Motor Car Repair Shop



YOUR OWN IDEAS

EDITOR'S NOTE—Ed Bowman, Horse Cave, Ky., comes through with a novel way of fitting bearings. He makes the bearings fit themselves in. In other words he runs them dry and smokes them to a fit. It is a rather unusual way of doing things and at first thought might appear rather dangerous. But, if the job is handled with great care, and the operator plays the safe side at all times to prevent the bearing metal from burning or melting, there is no reason why this should not be very good. This method of Ed Bowman's seems to be something easier and quicker than the usual method. Possibly some other MOTOR AGE reader does it another way with satisfactory results. Let us have your way of doing it.

Farmer Brown, who owned land adjacent to Farmer Smith, was the more wealthy of the two, because his initial capital permitted him to equip his farm with more modern tools and implements. Both had about the same number of acres, and it was equally valuable as agricultural land.

As each year rolled around Farmer Brown got more for his crops than Farmer Smith because he had the facilities to turn out more bushels per acre. Still, they both received the same figure for their produce, and they could have sold any amount more if they could have raised it.

One day Farmer Brown called on

Farmer Smith and asked him "how's crops." Smith was optimistic but admitted he lost a lot of money because he did not have the proper equipment. Farmer Brown was a competitor—but neither had trouble selling his entire output. Therefore, Farmer Brown loaned Farmer Smith the money to buy implements and tools and now they are both doing a greater business because of this co-operation.

Suppose Farmer Brown was Garageman Brown and Farmer Smith was Garageman Smith, and it was not money that Smith needed, but ideas. If Brown showed Smith how he did things in his garage, they would both

benefit by it—and serve the public better.

If you are using some home-made device that you think is mighty good send it to MOTOR AGE, and let us give it to some other repairmen through these columns. They have some ideas that they will, in turn, give to you.

Send us rough sketches of what you have made and find useful. Send us repair hints and kinks you have adopted to save time and money in maintaining a car. Read the two printed on this page this week. Didn't you get ideas out of them both? Then, give an idea in return.

Two Ideas Already Received

Island, Ky.—Editor MOTOR AGE—In Fig. 1 is a sketch of a home-made press for removing timing gears, gearset gears, bushings, making replacements, etc. This has been an important equipment in my shop for the last 2 years. It is made up of the following material:

- 1—Oak piece 6 by 8 by 38 in.
- 2—Oak piece 4 by 8 by 38 in.
- 2—Oak piece 2 by 8 by 53 in.
- 2—Oak piece 4 by 4 by 10 in.
- 2—12 by 1/4 in. bolts.

Horse Cave, Ky.—Editor MOTOR AGE—I wish to tell you of a method we use in fitting up bearings. So far as I know we are the only ones using this system, and I will give you a detailed description of the process and the results we get.

We have a 3-hp. gasoline engine bolted to a short line-shaft on which there is a fixed pulley and an idler pulley. This line-shaft is in the frame that we bolt the motor block on. On the end of the shaft there is a starting-crank ratchet which, after the block is in place, engages with the fan-drive pulley on the crankshaft.

The bearing caps are removed and enough shims are removed to make a snug fit on the bearing that is to be fitted in. The caps are then replaced and bolted to a loose fit. The power is then applied, and if the cap is too tight the nuts are backed off, and if too close they can be tightened while

- 2—6R by 1/4 in. bolts.
- 2—Strip iron 1/2 by 2 by 24 in.
- 1—Heavy ratchet screw jack for gear pulling.

In using this press you put the axle or shaft or whatever you may be working on between the upper beams and the jack. Then, by placing a U-shaped iron, an old magnet closed to fit the work, between the gear and the upper beams the gear can be easily removed.

the crankshaft is in motion. The nuts are tightened an equal amount until the bearing begins to smoke freely.

The cap is then examined, and if it does

In removing bushings and bearings you will have to make some small punches slightly smaller than the bushing or bearing. These should be brazed to a flat bar of iron, say 3 in. wide and 1/2 in. thick. The punches can be made out of old buggy spindles sawed off to about 2 in. in length, with the smaller end brazed to the plate so as to clear the sides when removing bushings and bearings.—W. C. Ferguson.

not show a fit all around and the full length of the bearing, the process is repeated. If the bearing is very high in spots the hand scraper is used, and if it is too low or too loose a fit, more shims are removed or the cap is filed down. This method is kept up until a perfect fit is shown the full length and all around the bearing. One bearing is fitted at a time, and the other bearings are kept well oiled.

Bearings fitted in this manner show up perfect in the Prussian blue test. I used this method for the first time about 4 months ago on a Ford block. Since then this car has seen some severe service, being run in a rough country and in use every day, and to-day this engine is exceptionally quiet. I have since used this method on several other engines and always got good results. If there is anything wrong with my method I cannot find what it is.—Ed Bowman.

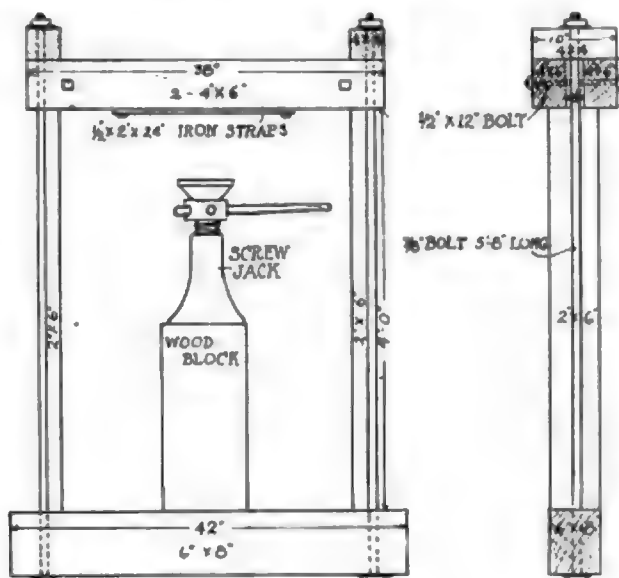


Fig. 1—Home-made press

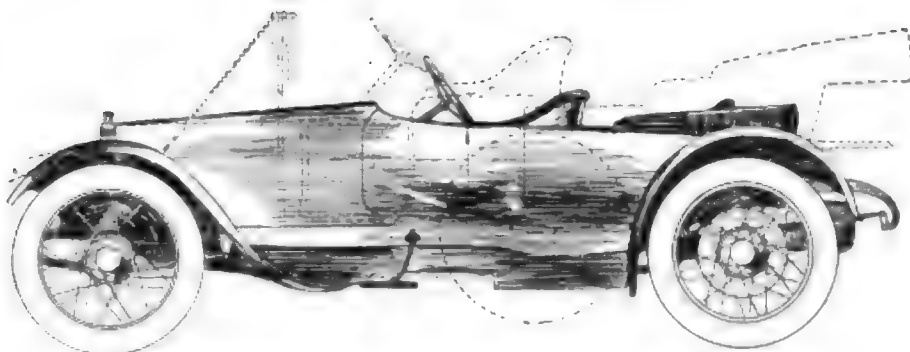


Fig. 3—Suggestion of alterations in body to reduce weight of Stearns-Knight

Transmission ratios—

On 4th .847:1 On ton. 3.22 :1

On dir. 1 :1 On rev. 4.52 :1

On 2nd 1.757:1

Total reduction between engine and rear axle—

On 4th 3.388:1 On ton. 12.88 :1

On dir. 4 :1 On rev. 18.08 :1

On 2nd 7.028:1

2—Have a new set of timing gears put on.

3—Probably the magnets of the magneto need remagnetizing.

SOME JOB TO NARROW FORD TREAD
Specification of Royal Tourist—Last Built in 1912

Glenwood, Ind.—Editor MOTOR AGE—Can a Ford front and rear axle be narrowed to 48 in. tread? If so, what companies do such work, and what would be the expense?

2—Where is the Aland Motor Car Co. located?

3—What is the bore and stroke of the Royal Tourist car?

4—By whom was this car manufactured and where located, and when did the company stop manufacturing?

5—What is the highest engine speed of a stock Ford motor?

6—What is the record tire change on racing cars, who made it, and where?—Harold E. Chaney.

1—It is our opinion that entirely new axles would have to be constructed to reduce the tread. Possibly the stock axles could be cut down but we have never seen it done, nor do we know of anybody in a position to do such work.

2—Detroit, Mich.

3-4—The bore and stroke of the 1912 model, which was the last built, was 5½ by 6. This was manufactured by the Royal Tourist Car Co., Cleveland, Ohio, which company was dissolved in 1912.

5—Around 2000 r.p.m.

6—There is no official record tire change recognized by the American Automobile Association. However, the quickest time announced during a sanctioned race is 13 sec., and if our memory serves us correctly it was made by the late Bob Burman.

Lightening Stearns-Knight

Mount Joy, Pa.—I have a 1912 Stearns-Knight, four-cylinder, that weighs 4850 lb. What could be done to make this car lighter?

2—What would be the difference in weight were I to use wire wheels instead of the present wheels with rims?

3—Could this machine be made lighter by fitting a new body with one-man top?

4—Could Motor AGE give me an idea as to how this machine would appear with a clover-leaf or roadster body? Tires are carried on the rear.—P. Frank Schock.

1—About the only alterations which could be made to reduce weight would be

to install a new body and possibly fit wire wheels.

2—Probably around 100 lb.

3—Yes.

4—See illustration in Fig. 3.

COUNTERBALANCED CRANKSHAFTS

Not Enough Room to Add Counterweights to Ford Shaft

Seattle, Wash.—Editor MOTOR AGE—I am building a Ford speedster and would like the following information in regard to it:

1—What firms make counterbalanced crankshafts?

2—Is it possible to counterbalance a standard Ford crankshaft satisfactorily?

3—Would Motor AGE advise taking about ¼ inch off the cylinder cap yet not injure the bearings or heat the motor?

4—I can get steel pistons the same weight as aluminum pistons. Which would Motor AGE recommend? I believe steel pistons would be better in a Ford.

5—How large is it possible to ream a Ford valve seat? Will it stand ¼ inch? What is the size of the standard Ford valve. I have been told a Packard 18 valve can be used for this purpose.

6—Is there a better piston ring than a one-piece lap ring?

7—Who makes tungsten valves, and will the concern make a set of valves to order?

8—Does Motor AGE know of any one who makes a detachable head for a Ford with overhead valves? Kindly illustrate such a head. Here is my idea for such: The cap should not allow any gas to come through its regular passage, a gasket being used to keep that part closed. Take out the old valves, use old valve guides for pushrod guides, make small holes through the cap for the pushrods to go through to the rocker arms with two valves, say about 1½ in. A metal cover could be placed over this, if desired, to keep out the dust. I do not believe it would be any more trouble to install this than it would be to take a regular cap off to clean carbon. One could also use the regular camshaft where there are overhead camshafts. It seems to me this is the dope for racing. A sixteen-valve could be arranged the same way. Large valves help any motor power and speed.—R. Lichtenberger.

1—MOTOR AGE has no record of a concern manufacturing counterbalanced crankshafts for Ford engines.

2—There is not enough surplus room in the Ford crankcase to enable you to at-

tach balancing weights to the crankshaft.

3—MOTOR AGE has never advised planing down the cylinder head to increase compression.

4—Steel pistons have never been used extensively because of their hardness in comparison with the cast-iron cylinders in which they work.

5—Not more than ⅛ in. The size of the standard Ford valve is 1¼ in.

6—So many are the types of good piston rings on the market that it is impossible to designate one particular kind.

7—Rich Tool Co., Railway Exchange Bldg., Chicago. This company will handle special orders.

8—Robert M. Roof, Anderson, Ind., and D. R. Noonan, Paris, Ill., manufacture overhead-valve attachments for Ford engines. The Roof attachment was illustrated in the Jan. 25 issue of MOTOR AGE, page 98. Neither of these exactly follow the idea you have.

Velle Ignition Timing

Sylvania, Ga.—Editor MOTOR AGE—I have a 1914 series 9, four-cylinder Velle car with four-passenger or baby-tonneau body. What is the gear ratio of this car in second, third and fourth speed?

2—What is the correct method of setting the ignition on this engine? It is set now so that the spark occurs when the piston is about ¼ in. down before dead center, and it knocks with retarded spark on a pull. The motor is not carbonized.—G. H. Hilton.

1—The gear ratios are as follows:

First: 3.2 to 1.

Second: 1.68 to 1.

Third: 1 to 1.

Fourth: .792 to 1.

The rear-axle gear ratio is 3 13/14 to 1.

2—The magneto should be set so that the spark occurs 1¼ in. late on the fly-wheel. Yours is evidently set too early.

Alterations for Speed

Shubert, Neb.—Editor MOTOR AGE—I would like instructions for rebuilding a Maxwell 25, 1915 model, into a racing car, to be used on ½-mile tracks.

2—What gear ratio should be used? Where can these gears be purchased?

3—What tread would be best to use on such tracks?

4—Also, how much larger valves might be used and be safe under explosions?—R. H. Bailey.

1—The following alterations can be made to a car to increase its speed: Enlarge the valves, install a racing carburetor, install aluminum pistons and non-leaking rings, lap the cylinders, use higher gearing, use smooth or corrugated tread tires, reduce the body weight as much as possible by stripping, lower the seats as

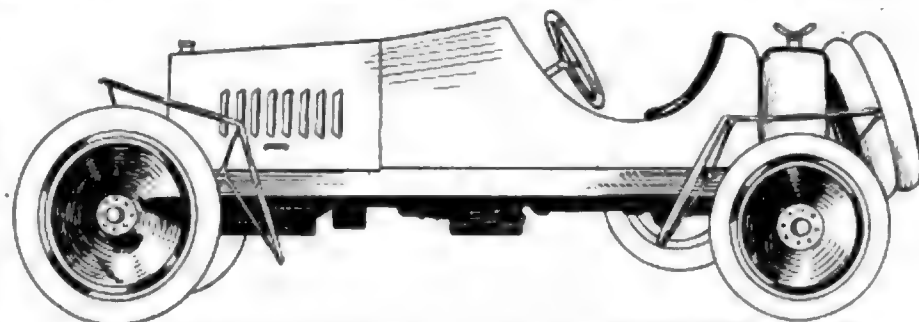


Fig. 4—Sketch of Bazon roadster converted into racer with speedy-looking body

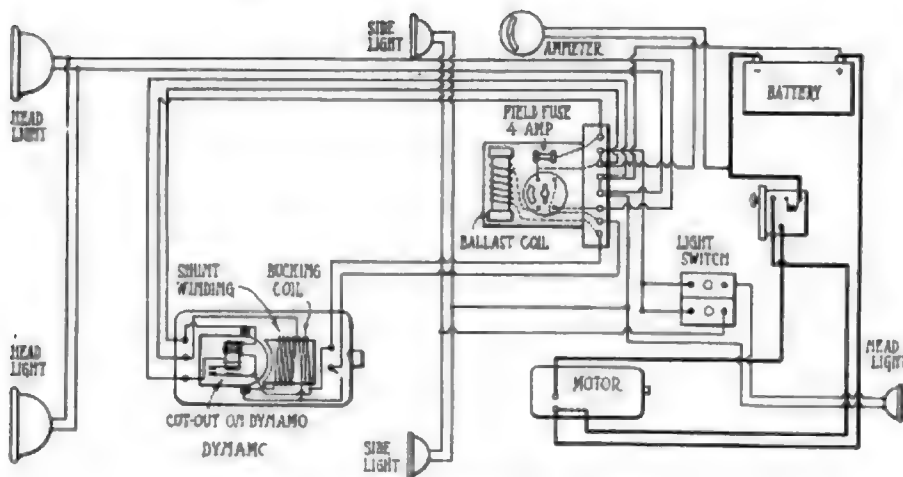


Fig. 5—Rushmore standard wiring system

much as possible, remove the fan if the engine will cool without boiling out the water, etc., etc.

2—Not less than 3 to 1 for $\frac{1}{2}$ -mile tracks. We know of no one who carries them in stock, unless it might be the car makers.

3—The standard tread.

4—The valves could be increased $\frac{1}{8}$ in.

MEANING OF CYCLE IN ENGINES

Cycle Is Event of Piston Traveling Length of Stroke

Chicago—Editor Motor Age—Make clear the meaning of four-cycle. Is a stroke 180 deg. a cycle or is the complete operation 360 deg. a cycle, or four strokes to complete the cycle?

2—Could one induce a secondary current without the use of a breaker or vibrator or without breaking the primary current?

3—Is there such an occurrence as compression being so great that it will not allow the spark to occur or make the spark out.—M. F. Herbert.

1—A cycle is generally in a series of events occurring in succession which goes to make up a complete operation. Some engines take more strokes to complete their cycles than do others. By far the greatest proportion in motor car practice require four strokes of the piston between explosions; that is, the piston travels up twice and down twice, making two revolutions of the crankshaft between explosions. These have come to be called four-cycle engines. There are others which take only two strokes, one up and one down; that is, one revolution of the crankshaft to complete the cycle. These are called two-cycle engines.

2—Yes. A secondary current is induced whenever the primary current changes in strength or direction and is proportional to the rapidity of the change. A quick break is the most rapid change in strength and consequently induces the greatest current in the secondary, other things being equal.

3—Yes. Frequently a plug will spark properly in the open air, but will not spark across the higher resistance of compression in the cylinder.

Rushmore Standard Wiring

New Orleans, La.—Editor Motor Age—Kindly publish a diagram of the Bosch-Rushmore starting and lighting system on the 1911

Locomotive; also the internal connections of the Rushmore dynamo used in this outfit.—Oswald Lubrey.

The Rushmore standard wiring is illustrated in Fig. 5. It is assumed that this is the system referred to.

Saxon and Cadillac Wiring

Ocala, Ga.—Editor Motor Age—Kindly publish a diagram of a Gray & Davis starter and generator which is used on the model S-2-T Saxon touring car, 1915 model.

2—Also, please publish a wiring diagram of the 1917 Cadillac, model 65.—S. E. Simpson.

1—Shown in Fig. 7.

2—Shown in Fig. 6.

Why Use of 12-Volt

Madison, S. D.—Editor Motor Age—Where can I tap a Hudson Super-six to install an auxiliary air valve? The intake manifold is cast with the cylinder block.

2—In case my storage battery went wrong, where would I connect up emergency dry cells? What should be done to the generator in such a case?

3—Why does the new Harroun car use a 12-volt storage battery when it has a two-unit electric system? My observation has been that a 6-volt battery is just as efficient as a 12-volt and is certainly less trouble to take care of and is cheaper to replace if necessary.—H. H. Frudenberg, M. D.

1—In the center of the block and into the manifold at a point about 1 in. above the carburetor intake.

2—Emergency dry cells could be connected to the storage battery terminals. The generator should be completely disconnected and the circuit closed up as if it did not exist.

3—This seems to be a matter of varying opinion. Some engineers prefer the 6-volt system, some the 12. We do not be-

lieve that investigation will allow you to retain your idea that the system with the higher voltage is more troublesome than the other.

FITTING PISTON RINGS ON FORD

Inquiries Are Referred to Article in This Week's Issue

Yonkers, N. Y.—Editor Motor Age—Explain method of fitting new piston rings on a Ford motor.

2—Can the piston be fitted without taking the cylinder block off?

3—How are the main bearings tightened?

4—Is it possible to replace the lower fan belt pulley without taking down the motor?—Ed McKeever.

1—See article on page 34 of this issue.

2—No.

3—After the engine has been taken out of the car remove the crankcase, gearset cover, cylinder head, pistons, connecting rods, gearset, and magneto coils. Take off the three babbitted caps and clean the bearing surfaces with gasoline. Apply Persian blue or red lead to the crankshaft-bearing surfaces, which will enable you, in fitting the caps, to determine whether a perfect bearing surface is obtained.

Place the rear cap in position and tighten it up as much as possible without stripping the bolt threads. When the main bearing has been properly fitted, the crankshaft will permit moving with one hand. If the crankshaft cannot be turned with one hand, the contact between the bearing surfaces is evidently too close, and the cap requires shimming up, one or two brass liners usually being sufficient.

In case the crankshaft moves too easily with one hand, the shims should be removed and the steel surface of the cap filed off, permitting it to set closer.

After removing the cap, observe whether the blue or red painting indicate a full bearing the length of the cap. If the painting does not show a true bearing, the babbitt should be scraped and the cap refitted until the proper results are obtained.

Lay the rear cap aside and proceed to adjust the center bearing in the same manner. Repeat the operation with the front bearing, with the other two bearings laid aside.

When the proper adjustment of each bearing has been obtained, clean the babbitt surface carefully and place a little

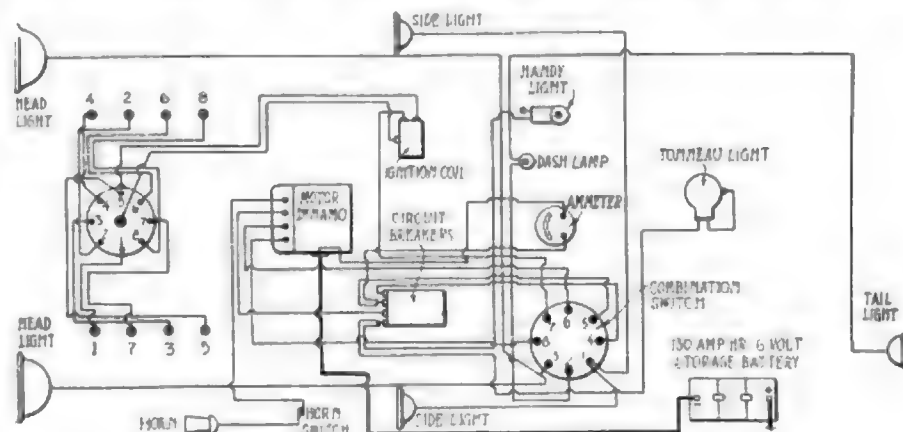


Fig. 6—Wiring diagram of 1917 Cadillac

lubricating oil on the bearings, also on the crankshaft; then draw the caps up as close as possible—the necessary shims, of course, being in place. Do not be afraid of getting the cap bolts too tight, as the shim under the cap and the oil between the bearing surfaces will prevent the metal being drawn into too close contact. If oil is not put on the bearing surfaces, the bab-bitt is apt to cut out when the engine is started, before the oil in the crankcase can reach the bearings.

In replacing the crankcase and gearset cover it is advisable to use a new set of felt gaskets to prevent oil leaks.

Cleveland, O.—Editor *MOTOR AGE*—Explain methods of undersliding a Ford.

2—Could the stroke of a Ford be enlarged, and if so, how and how much? How much could the bore be enlarged?

3—Do the Goodrich people market a 32 by 4 Slivertown cord tire?

4—What company makes the radiator used on the Peugeot racing cars?

5—Is 2 1/2 to 1 the highest gearing that could be used on a Ford for track work?—J. E. Kelly.

1-2—See the article on page 34 of this issue.

3—No.

4—These are made in France. The name of the maker is not known to us.

5—See answer No. 1.

DeKalb, Ill.—Editor *MOTOR AGE*—How can the chassis and frame of a Ford car be lowered in converting it into a speedster?—I. F. Quinn.

See article on page 34 of this issue.

Omaha, Neb.—Editor *MOTOR AGE*—Give the names and addresses of concerns specializing in parts to be used in undersliding a Ford car.

2—We would appreciate any suggestions or drawings covering changes such as we desire to make, namely bringing the car closer to the ground by lowering the springs, axles, etc.—A. B. Zwiebel.

1—To our knowledge there is no one at present making parts specially for undersliding a Ford car.

2—See the article on page 34 of this issue.

Saxon Into Speedster

Hobart, Okla.—Editor *MOTOR AGE*—Publish a diagram showing how to convert a 1916 Saxon into a speedster.

2—State where parts may be secured for this work.—L. E. Duncanson.

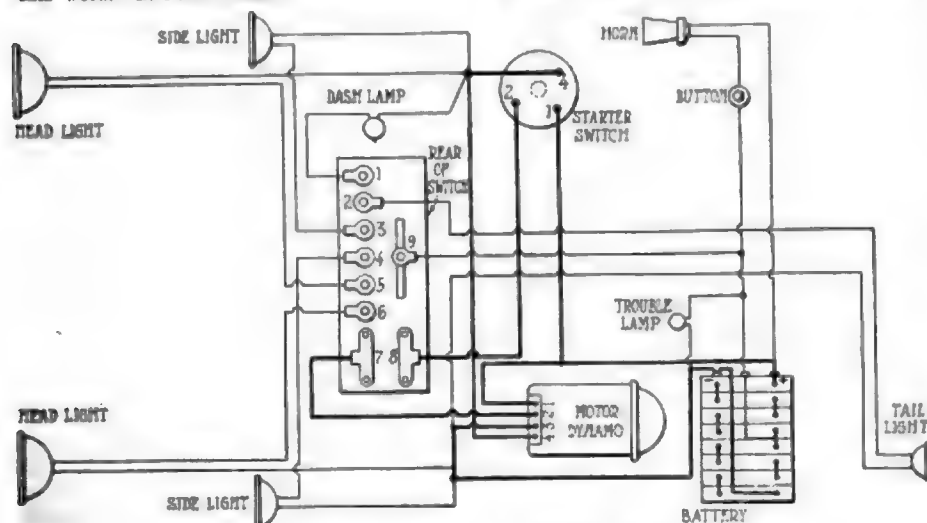


Fig. 8—Wiring diagram of Michigan car

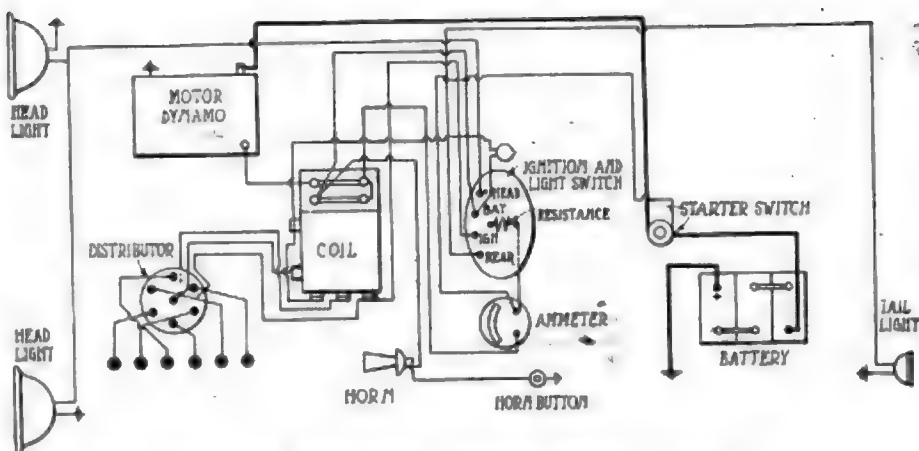


Fig. 7—Diagram of Gray & Davis starter and generator on Saxon

1—Two body types are shown in Fig. 1, another in Fig. 4.

2—Special bodies for this model are manufactured by Charles Schutte, Pennsylvania Auto Co., Lancaster, Pa.

Worm and Bevel Drive

Peoria, Ill.—Editor *MOTOR AGE*—Is there any more friction in a worm drive than a bevel gear, or any other drive? If there is, is it as long, and has it as much power as other drives?—E. Weinstein.

The worm drive, in practice, has no more friction than other types. The contact surface is greater than the ordinary bevel drive and consequently the wearing qualities are good. There is no greater power loss, and probably even less.

Michigan Wiring Diagram

Ottawa, Kans.—Editor *MOTOR AGE*—Is the Jones Electric Starter Co. still located in Chicago?

2—Furnish me with a diagram of the electrical system used on the Michigan 40, the last model they built.—A. Lee Gray.

1—Yes, as Roth Bros.

2—Illustrated in Fig. 8.

Warren Engine Vibrates

Weston, Ill.—Editor *MOTOR AGE*—I have a 1918 Warren car which runs well up to 20 m.p.h.; above that it vibrates, and at 35 m.p.h. it is hard to hold the steering wheel. I also have trouble in keeping the lower ends of the connecting rods tight. If this engine is out of balance what can be done to remedy it? Would light pistons help any?—John F. Schneider.

It would be our supposition that the en-

gine is more out of line than out of balance. This impression comes from the fact that you have trouble keeping the connecting rods tight. An experienced garageman, having at hand equipment for lining up an engine, could very likely find the fault if it was there. If the trouble is really in the balance of the engine light pistons would have their effect in smoothing out the action, although the improper balance might not come from the pistons at all.

BORE AND STROKE OF JAY-EYE-SEE No Production of Cars Using Kerosene as Fuel

Gridley, Ill.—Editor *MOTOR AGE*—What is the S. A. E. rating of the 1915 Case, the 1914 Inter-State 6-45, and the Buick small and large sizes?

2—What are the advantages of the eight and twelve cylinders?

3—Give the names of cars using kerosene for fuel.

4—State the bore and stroke of Disbrow's Jay-Eye-See.—A Reader.

1—The Case was made in three models in 1915. The N. A. C. C. ratings of the models are: Model 25, 22.5; model 35, 29; model 40, 32.4. The Inter-State 6-45 has an N. A. C. C. rating of 38.4. The small Buick six has a rating of 27.4 and the large six, 1915 model, 33.7.

2—To give a more even flow of power than is possible with engines of a less number of cylinders. In other words, there are more power impulses per revolution of the crankshaft, thus reducing or eliminating the period when there will be no power delivered to the crankshaft. This tends toward freedom from vibration and engine flexibility.

3—At the present time there are no cars manufactured in quantities that use kerosene as a standard fuel.

4—The engine of the Jay-Eye-See has a bore of 9 1/4 in. and a stroke of 8 1/2 in.

THICKNESS OF GENERATOR BRUSH Third Brush May Stick Because of Accumulation of Oil

Malmo, Nebr.—Editor *MOTOR AGE*—What size of brush is used on a Delco generator in a 1916 Buick 45?

2—What causes the generator to stick so that it has to be cranked?—J. Edward Jackson.

1—The main generator brushes are 3/4 in.

ucts to market and carry back supplies. With oats wholesaling at \$1.50 the hundred pounds and hay at \$25 the ton, gasoline at the highest price is dirt cheap when used on a light delivery car which does the work of a horse, and a very light motor vehicle could do just that.

This delivery wagon should be sturdily built, weight about 500 lbs. and sell under \$200.

What factory will now begin to supply the demand? If satisfied with a reasonable profit, the manufacturer could grow with a constantly increasing profit through the coming decades.—S. Ross Parker.

FORD WIRE WHEELS ON HUPP 20 Can Be Interchanged in Front But Not in Rear

Buckholts, Tex.—Editor MOTOR AGE—Is it possible to use Ford wire wheels on a 1912 Hupmobile 20, and if so, how could it be done? 2—What is the correct method of timing a camshaft and magneto, the latter being a set spark?—C. A. Lamkin.

1—It is quite possible to use the front wheels of the Ford car on the front axles of the 1912 Hupmobile model 20. There is, however, a difference in the Ford rear axles and those of the Hupmobile, and in order to use these it would be necessary to have new inner hubs. The Houk people are not in a position to do the machine work on these at the present time, but could furnish you with the castings for the two rear inner hubs and the machining would be a very simple operation.

2—We cannot give you the camshaft setting without knowing the make of car to which it applies. Magneto settings follow a fixed rule. Place the piston in No. 1 cylinder at top center. Set the breaker points in the magneto so that the points for No. 1 cylinder will be just ready to break. To make this setting the spark should be set at full retard.

SPECIFICATIONS OF PEUGEOT CAR Cannot Estimate Speed of Stripped-Down Studebaker

Lake Providence, La.—Editor MOTOR AGE—What is the horsepower, wheelbase, piston size and weight of Resta's and Altken's Peugeot? Also give the cost and highest speed these cars have attained.

2—What speed could a Studebaker 6-16 car maintain on a track, stripped with a racing axle ratio?

3—What is the gear ratio of the Peugeot cars?

4—Where could I obtain wire wheels for a Studebaker 6-16 model?

5—What is the best track speed of the Packard Twin Six?—J. S. Pittman.

The N. A. C. C. horsepower rating is 20.9. Brake horsepower is somewhere around the 100 mark. The wheelbase is 106 in. the piston diameter 3.62 in. and the bore 6.65 in. This gives a piston displacement of 274 cu. in. There is no available record of the cost. Both cars have attained speeds around 115 m.p.h.

2—There is no means of estimating, because it depends on such a multitude of things.

3—3.1 to 1.

4—Any wire wheel maker can furnish them.

5—In the official trial on the Chicago speedway in July, 1915, a speed of 72.6 m.p.h. was attained. This was a strictly stock car.

Safety First Suggestion

Oshkosh, Wis.—Editor MOTOR AGE—A suggestion from a subscriber for Safety at country railroad crossings:

Put up a sign about 3 ft. by 5 ft., 400 ft. from each crossing, thus,

STOP
Railroad Crossing
400 ft.

Have the word stop in large red letters, the other letters in black and the sign board white. This sign could be seen 1000 ft. from the crossing and the car could be brought under control. The expense of erecting these could be divided 50-50 be-

tween the railroads and state.—F. G. S.

Power Curves and Data

Washington, D. C.—Editor MOTOR AGE—Kindly publish the horsepower curves and standard high gear ratios of the following makes of cars: Chalmers 20, Moon 66, Jeffery Six, Hudson Super Six, Mitchell Six, Buick Six and Cadillac Eight. If the curves are not available kindly give the maximum horsepower with the corresponding r.p.m.—A. C. Hobart.

The horsepower curves available are published in the group in Fig. 10. The maximum horsepower of the 3½ by 5 six-cylinder Mitchell engine is 55 and the corresponding r.p.m. is 950. The standard high-gear ratio is 4½ to 1. The Buick engine is said by the factory to be capable of developing 45 to 48 hp. at 2200 r.p.m. The standard gear ratio is 4.08 to 1 with 34-in. wheels. The Hudson engines pull a maximum of about 4 hp. at about 2000 r.p.m. The standard gear ratio on the Moon model 6-66 is 4½ to 1; on the Jeffery, 4½ to 1. The rear-axle ratio on the five-passenger Chalmers 6-30 is 4:75 to 1, on the seven-passenger, 5:18 to 1.

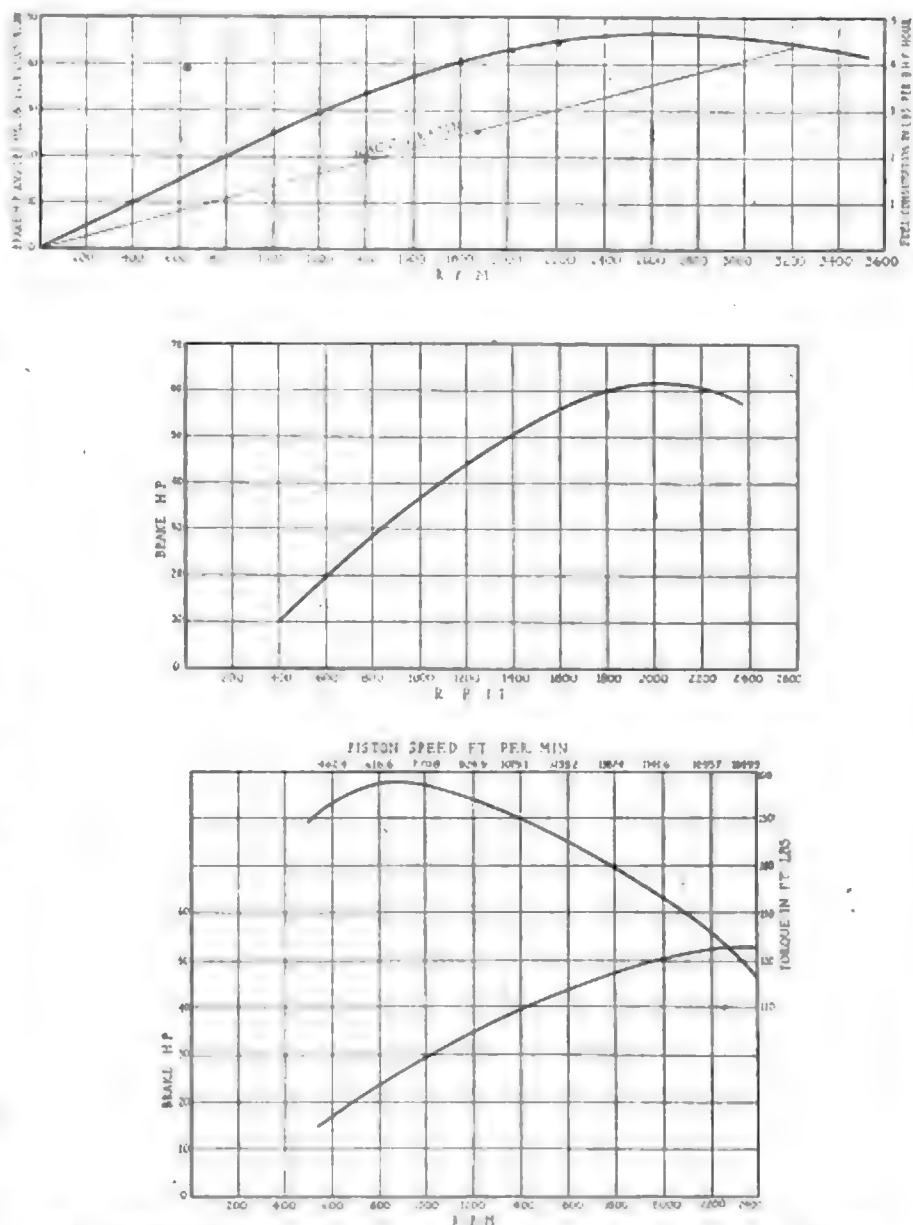


Fig. 10—Horsepower curves from top to bottom of the Chalmers, Moon and Jeffery

it is claimed in Champaign that the system greatly expedites deliveries as well as reducing costs and is giving entire satisfaction not only to the dealers but to patrons as well.

Jersey Fees Near Million—By the turning over to Comptroller Edwards of a check for \$912,522.57, Motor Vehicle Commissioner William L. Dill indicates that the New Jersey motor vehicle fees for January will total more than \$996,000.

Good Roads Meeting April—The annual meeting of the United States Good Roads Association will be held in Birmingham April 17-20. The first two days of the meeting will be devoted to the work of the association, while the third will be used for sessions of the Bankhead Highway Association. The fourth day will be occupied by a general good roads meeting. A show of materials and machinery will be one of the features of the meeting.

Makers to Help Advertise City—The Wisconsin Motor Mfg. Co., A. O. Smith Corp., Gemco Mfg. Co., Sterling Motor Truck Co., and Cutler-Hammer Mfg. Co. are among the twenty-five large Milwaukee industrial corporations which have contributed \$1,000 each toward a fund being raised by the Milwaukee Forward League to advertise the city. The League will spend \$50,000 or more in purchasing advertising space in magazines and other publications of national circulation.

\$600,000 May Free Toll Roads—The commission appointed by the New Jersey legislature to look into the advisability of the state purchase of toll roads and bridges has recommended that \$611,085 be appropriated for this purpose. The roads and bridges to be bought are: Gloucester turnpike, \$68,000; Bridgeton-Millville turnpike, \$18,000; Marlboro-Quinton turnpike, \$10,000; Ocean City-Somers Point bridge, \$271,639; Long Beach bridge, \$93,446; and the Toms River-Seaside Heights bridge, \$160,000.

Car Herds Ostriches—A flock of Nubian ostriches at the Cawston ostrich farm in Los Angeles, Cal., became excited recently and stampeded. Nobody seemed able to quiet them or control them. Finally, Jonathan S. Dodge, owner of the farm, suggested the men use the Inter-State car parked nearby. The driver made several trips around the inclosure to head the birds off against a high fence, but the flock was quieted. The unevenness of the ground, trees and feed troughs made travel uncertain and added to the excitement of the job.

New Jersey Wants New Commission—A bill is to be introduced in the New Jersey legislature to provide a state highway commission of eight men to replace the present commissioner. These men would serve without pay and would appoint a state highway engineer who would have complete charge of administration of the department. The plan is to ignore the Egan bill, which provided for a \$7,000,000 bond issue, and to pass another bill for the levy of a special tax for roads. The bill proposes to raise \$3,000,000 a year for five years. Motor car fees and fines would be put in repairs and construction.

Minnesota May Raise Fees—Much motor legislation is before the Minnesota legislature now. Bills have been introduced to raise the motor car registration fee to \$6 a year and motorcycle fee to \$3, to deprive drivers convicted of intoxication while driving of license for three months; to register and preserve highway trails; to make it a felony to steal a car; to make possession of car with altered factory numbers prima facie evidence of theft; to tax 25 cents per horsepower and 25 cents per 100 lbs. on motor vehicles, to be in lieu of other taxes on the vehicles. A dimmer bill has been offered, prohibiting use of lights which project more than 3 ft. above the surface of the road 75 ft. ahead of the car, exempting fire ap-

paratus and publicly owned vehicles, and providing for examination of lights by county sheriffs and a fee of 25 cents for certificate of examination.

Old Tires for Red Cross—Motorists in Winnipeg are being asked by the Winnipeg Automobile Club to save their old casings and tubes for the benefit of the Canadian Red Cross society.

Loops the Loop on Skid—When his car skidded on the icy road, Raymond Miller, Jobstown, N. J., escaped without a scratch, though his car left the road and turned a series of somersaults down a steep embankment. The car was wrecked.

May Protect Serial Number—The Wisconsin Legislature is considering a bill which places a penalty of a fine of not more than \$200 or a jail term of not to exceed six months on conviction of the charge of destroying or defacing the manufacturers' serial mark on motor vehicles of any kind.

May Connect Montreal and Vermont—A movement is being made to get a highway from Montreal to St. Albans, Vt., which would tap a lot of tourist country. The Business and Professional Men's Association of St. Albans has taken the matter up with residents of St. Johns. Now they are after the Automobile Club of Canada, and the president has written to G. A. McNamee suggesting that a deputation of six or eight members visit St. Albans to meet the representatives of the association and some men from St. Albans to discuss the most feasible route and the best method of obtaining a

first-class highway connecting Montreal with St. Albans and points on the west side of Lake Champlain down through to the Berkshire Hills and New York.

Millions for Roads—After the \$75,000,000 appropriated by the Government is added to the sum total of road money to be spent by the states, the grand total of \$352,000,000 is reached. For, among issues we have these that either have been voted or are being agitated: Pennsylvania, \$50,000,000; Illinois, \$60,000,000; Colorado, \$50,000,000; New Jersey, \$7,000,000; Louisiana, \$20,000,000; and California, \$15,000,000.

Roads May Help Canadian Labor—A deputation consisting of representatives of the various provincial governments, returned soldiers' associations, labor and other organizations interested in the foundation of a National Labor Bureau to deal with the labor problem at the close of the war will wait on the federal government in Quebec City soon. Several delegates will be from Montreal, and the president of the Dominion Good Roads Association, J. Duchastel, of Outremount, probably will represent the congress which last year passed a resolution endorsing the proposal.

Texas Considers Highway Commission—The State Highway Commission Bill has passed the Texas House of Representatives with only one amendment. This amendment provides that the revenues to be obtained from taxing motor vehicles shall be apportioned equally between the county from which the amount is derived and the state, whereas the original bill made a division of 33 1/3 per cent to the county and 66 2/3 per cent to the state. Motor vehicles are taxed on their horsepower, and it is estimated that the average tax per vehicle will be about \$10 per annum. Inasmuch as there are estimated to be at this time approximately 235,000 motor vehicles in Texas, the revenue to be derived from this source will amount to \$2,325,000 per annum, all of which will go towards highway building and improvements.

Coming Motor Events

RACES

—1917—

- May 19—Metropolitan Trophy, New York speedway.
- May 30—Indianapolis speedway.
- June 6—Chicago speedway.
- June 23—Cincinnati speedway.
- July 4—Omaha speedway.
- July 14—Des Moines speedway.
- July 28—Tacoma speedway.
- August 4—Kansas City speedway.
- September 3—Cincinnati speedway.
- September 18—Providence speedway.
- September 29—New York speedway.
- October 6—Kansas City speedway.
- October 13—Chicago speedway.
- October 27—New York speedway.

I. A. A. championship events for 1917.

SHOWS

- Feb. 24-March 3—Newark, N. J.
- Feb. 24-March 4—Atlanta, Ga.
- Feb. 24-March 6—Brooklyn, N. Y.
- Feb. 26-March 3—Omaha, Neb.
- Feb. 26-March 3—Great Falls, Mont.
- Feb. 26-March 3—Utica, N. Y.
- Feb. 26-March 3—Charleston, S. C.
- Feb. 26-March 3—Wilkes-Barre, Pa.
- Feb. 26-March 3—Utica, N. Y.
- Feb. 28-March 3—La Fayette, Ind.
- March 1-3—Urbana, Ill.
- March 3-6—Green Bay, Wis.
- March 3-10—Boston.
- March 3-10—Washington, D. C.
- March 5-10—Bridgeton, Conn.
- March 5-10—Parsons, Kan.
- March 5-10—Jamestown, N. Y.
- March 5-12—Birmingham, Ala.
- March 6-10—Fort Dodge, Iowa.
- March 7-10—St. Joseph, Mo.
- March 7-14—Canton, Ohio.
- March 12-14—Fort Worth, Tex.
- March 13-16—Vancouver, B. C.
- March 13-16—Fargo, N. D.
- March 13-17—Denver, Colo.
- March 14-17—Davenport, Iowa.
- March 14-17—Kenosha, Wis.
- March 14-17—Mason City, Iowa.
- March 17-24—Pittsburgh, Pa.
- March 19-24—Paterson, N. J.
- March 19-24—Cedar Rapids, Iowa.
- March 21-24—Trenton, N. J.
- March 27-31—Clinton, Iowa.
- March 27-31—Deadwood, S. D.
- April 4-7—Stockton, Cal.

The Show Circuit

Fort Worth to Have Show—A show will be held at Fort Worth, Tex., in connection with the Fat Stock Show March 12-14. Many Dallas dealers have contracted for space in the coliseum. Thousands of visitors every year see this fat stock show. Tom Cooper of Fort Worth is in charge.

10,000 at Racine Show—The fifth annual motor show at Racine, Wis., which was held Feb. 15-19, attracted more than 10,000 people, or a fourth of the total population of Racine. Thirty-one different makes of cars were exhibited, among them the Mitchell and Case, made in Racine. The show was managed by Charles A. Myers.

Des Moines Truck Dealers' Show—The first annual Des Moines motor truck show was staged on the same days as the motor car show, by the motor truck dealers of Des Moines. Two trucks, a 12,000-lb. Mack and a Little Giant, made an endurance run from Chicago to be exhibited at the show. The truck display was in the Des Moines auditorium, and all space was sold. George Hippen of Des Moines managed the show.

Ninety Cars at Duluth Show—Ninety gasoline and electric cars and thirty trucks and accessories were displayed at the show in Duluth last week. The pleasure cars were exhibited on the main floor, and the trucks and accessories in the basement. The armory, in which the show was held, was decorated with American flags and colors and contained a large portrait of George Washington, whose birthday came during the week. The show was Duluth's third annual show and was a third larger than the exhibition of last year.

tion at Minneapolis. Mr. Weil was at one time assistant sales manager for the Republic Rubber Co.

Hunt Joins Stromberg Forces—Scott F. Hunt, an engineer with the Zenith Carburetor Co., Detroit, has resigned to join the organization of the Stromberg Motor Devices Co., Chicago.

Accessory Company Starts Manufacture—The Auto Specialty Mfg. Co., St. Joseph, Mich., has started work with 350 employees and will manufacture Bair-Bow springs, top-holders, malleable iron parts, and castings.

National's Shipments Grow—The National Motor Car Corp.'s shipments in January were 100 per cent ahead of the corresponding month last year and 50 per cent ahead of the requirements to dispose of the year's output. The sales for the month of February, it was stated, would be correspondingly good.

Joins Export Business—Tom Jones, an old newspaper man who several years ago went around the world in a Hupmobile with Joseph R. Drake, president of the Hupp Motor Car Co., has resigned his position as advertising manager of the Empire Automobile Co. and has sailed for Europe to join a motor car export company.

Frost with Chalmers—A. G. Frost has joined the sales staff of the Chalmers Motor Co. and will do special sales work under the direction of E. C. Morse, vice-president and general manager. Mr. Frost is one of the veterans of the Broadway, New York, motor car district and was associated with Mr.

Morse when the latter was with the E. R. Thomas Motor Car Co.

Saxon Output Growing Rapidly—The Saxon Motor Car Corp. is producing seventy-five cars daily and will soon reach the 100 mark. It has recovered quickly from the effects of the recent fire.

Diebrow Officials Appointed—W. D. Callinan has been made first vice-president of the Diebrow Motors Co., Cleveland, Ohio. Edward P. Strong is second vice-president, and Morris Becker, secretary and treasurer.

Woodside Is Made Superintendent—William P. Woodside has been appointed superintendent of plant 4 of the Studebaker Corp. Mr. Woodside was formerly with the Crucible Steel Co.

Ford Building in N. J.—The Ford Motor Co. will give up its Long Island City plant in about a year. The company has started to build its plant at Kearny, N. J., and is now laying the foundation for a dock for export business. When this plant is completed operations in the Long Island City plant will be transferred to Kearny.

Record in Sales and Profits—The Detroit Steel Products Co. in its report to stockholders, at the recent annual meeting, showed that the sales and profits for 1916 made the company's most successful year and that the outlook for 1917 points to a still greater prosperity. The sales for January of this year total 100 per cent more than the sales for 1916. The company is erecting several build-

ings. An extra dividend of 10 per cent was declared in addition to the regular annual dividend of 7 per cent.

To Build Models in Indianapolis—W. A. King, production manager of the Tulsa Automobile Corp., Tulsa, Okla., will build his model cars in Indianapolis.

Fisher Tool Holds Meeting—The Fisher Tool & Supply Co. has elected Roy Fisher president; Ralph Hoagland vice-president and sales manager, and Herman Fisher secretary and treasurer for the coming year.

Texas Plant Starts in March—The plant of the Chevrolet Motor Co. at Fort Worth, Tex., will commence operations this month. The Chevrolet company expects to produce 540 cars a day by that time. Its daily output now being 400 cars. The schedule calls for 600 cars a day by July 1.

Offers Stock to Public—The Biggam Trailer Co., organized with an authorized capital stock of \$200,000, of which \$150,000 is common and \$50,000 preferred, is offering its stock to the public on a basis of two shares of preferred to one share of common. Par value of the stock is \$10 per share.

Drives Fifty Cars—M. V. DeForrest, Sharon, Pa., drove fifty cars from Flint, Mich., to Sharon last week and came back to Flint with fifty men, planning to make a similar driveaway. DeForrest is the Buick distributor at Sharon and has been unable to get cars because of the congested freight situation.

New Philadelphia, Ohio—Old Central Garage Co.; capital stock, \$10,000; incorporators, R. O. Finger, C. O. Hawk, Fred Schumler, Mrs. Margaret Finger and Mrs. Bernice Hawk.

Newark, N. J.—New Jersey Electric & Auto Supply Co.; to manufacture electrical supplies; capital stock, \$25,000; incorporators, Jerome Rafferty, H. L. Doolittle and M. B. Doolittle.

Omaha, Neb.—Western Motor Car Co.; capital stock, \$20,000; incorporators, Charles Hannan, Jr., W. S. Johnson and E. V. Abbott.

Peoria, Ill.—Crescent Auto Co.; capital stock, \$10,000; incorporators, E. T. Knudsen, G. W. Hubbard and H. J. Ingram.

Pittsburgh, Pa.—Bigelow Motor Sales Co.; capital stock, \$15,000; incorporators, George Bieh, W. A. Bigelow and John E. Lauer.

Pittsburgh, Pa.—Allegheny Auto Co.; capital stock, \$50,000; incorporators, Leo D. Ker, Albert T. Lewis, J. R. Haney and John A. Manocoe.

Peoria, Ill.—Auto Kot Co.; capital stock, \$10,000; to deal in motor cars and supplies; incorporators, G. H. Page, J. W. Wenzler and G. T. Page.

Rutherford, N. J.—Sterling Tire Corp.; capital stock, \$2,500,000; to manufacture, purchase, hold, own and deal in rubber tires, vehicles, etc.; incorporators, Joseph A. Miller, Otto Basten and Barrett Green.

Rock Hill, S. C.—Anderson Motor Co.; Capital stock, \$1,500,000; incorporators, J. B. Johnson, J. G. Anderson, T. L. Johnston, J. M. Cherry, Alex Long and J. W. O'Neal.

Seattle, Wash.—Parsons Motor Car Co.; capital stock, \$20,000; incorporators, J. W. Parsons, V. V. Waldrup and J. H. Buckland.

St. Louis—D. C. L. Selling Corp.; capital stock, \$4,000; to deal in motor cars and accessories; incorporators, Ernest F. Oakley, Jr., Wm. Logan and Walter Meiler.

Steubenville, Ohio—Travelers Garage & Automobile Supply Co.; capital stock, \$25,000; to deal in motor car supplies; incorporators, James E. Cohen, Ralph B. Cohen, George Sampson, Morris Fineeman and Frank Grossman.

St. Louis, Mo.—Combination Auto Lock Co.; capital stock, \$10,000; incorporators, W. B. Halthaus, George A. Abel and H. F. Foulsing.

Seattle, Wash.—Parsons Motor Car Co.; capital stock, \$20,000; incorporators, J. W. Parsons, J. Y. Waldrup and Jesse Buckland.

Toledo, Ohio—Kibby & Pierce Co.; capital stock, \$20,000; motor cars; incorporators, Vernon G. Kibby, Arthur H. Pierce, Clara M. Valentine, R. Lucile Elton and Wesley H. Thurstin, Jr.

Toronto, Ont.—Canadian Auto Sales Co.; capital stock, \$40,000; incorporators, R. D. Hume and J. J. Greenan.

Recent Incorporations

Dayton, O.—Maxler Auto Truck Sales Co.; capital stock, \$10,000; incorporators, George H. Connelley, Herbert Ballie, J. L. Miller, Wm. P. Jenkins and J. Weaver.

Dever, Del.—Landover Auto Truck Co., to deal in and with attachments for motor cars and trucks, etc.; capital stock, \$300,000; incorporators, Arthur W. Britton, Samuel R. Howard and L. H. Gunther.

East Palestine, Ohio—National Tire & Rubber Co.; capital stock, \$1,000,000; incorporators, R. E. Waldo, H. A. Clark, H. B. Callahan, W. A. Sturgeon and H. C. Johnston.

Easton, Ohio—Auto Truck & Storage Co.; capital stock, \$10,000; to deal in trucks; incorporators, N. M. Watson, R. O. Riger, W. L. Knowles, L. L. Watson and W. M. Witherspoon.

Harrisburg, Pa.—Shafer-Oliver Automobile Co.; capital stock, \$5,000; incorporators, G. L. Oliver, A. V. Shafer and A. C. Snively.

Huntington, W. Va.—Gem Garage Co.; capital stock, \$10,000; incorporators, M. J. Ferguson, S. V. Williams, C. H. Williams, G. E. Merriman and L. L. McClure.

Lockport, N. Y.—Harrison Radiator Corp., to manufacture radiators, parts and accessories; capital stock, \$1,050,000; incorporators, Beononi Lockwood, F. A. Gaynor and R. G. Good.

Louisville, Ky.—Central Motor Car Co.; capital stock, \$15,000; incorporators, Allen H. Douglas, Robert L. Thomas and Horace C. Dunavent.

Memphis, Tenn.—Falcon Motor Car Co.; capital stock, \$150,000; incorporators, J. G. Hamblett, E. E. Karlson, J. R. Menley, G. A. McGinn and C. F. Kessler.

Milwaukee, Wis.—Achen Motor Co.; capital stock, \$45,000; incorporators, I. W. H. Achen, Arthur Gardiner, Robert Gardiner and Huddin Boorse.

Milwaukee, Wis.—Teutonia Motor Car Co.; capital stock, \$5,000; incorporators, Hugo Walter, A. C. Neltzel and Anthony Bartram.

Monro, Mo.—Reichel Motor Co.; capital stock, \$40,000; incorporators, Theodore Reichel, John W. Hatton and D. W. Acuff; to manufacture and deal in motor cars.

Marshall, Mich.—All Season Body Co.; to manufacture detachable motor car tops and accessories; capital stock, \$500,000; incorporators, J. A. McAvoy, Mansel Hackett, Ralph Trese and F. R. Bothwell.

Akron, Ohio—O'Neill Storage Battery Co.; capital stock, \$10,000; to deal in batteries; incorporators, W. P. O'Neill, George C. Austin, S. A. O'Neill, E. Brennan and I. A. Austin.

Akron, Ohio—Amazon Rubber Co.; capital stock, \$500,000; to manufacture tires; incorporators, Louis J. Schott, Louis F. Smith, Claud E. Bettler, J. Henry Adams and Frank B. Burch.

Chicago—Commercial Motors Co.; capital stock, \$200,000; incorporators, C. W. Greenfield, M. E. Rising and E. L. Harpham, Jr.

Cedarburg, Wis.—Boerner Auto Co.; capital stock, \$20,000; to deal in new and used cars; operate garage, repair shop, etc.; incorporators, O. A. Boerner, W. R. Boerner and R. V. Boerner.

Cleveland, Ohio—Gordon Square Auto Co.; capital stock, \$10,000; to deal in motor cars and supplies; incorporators, C. W. Thomas, W. P. Maurer, John F. Wilson, E. R. Dolin and A. L. Maurer.

Cleveland, Ohio—Mertz Co.; capital stock, \$100,000; to deal in motor cars; incorporators, R. A. Mertz, William E. Miller, I. E. Guentzier, P. Schulman and E. E. Gibson.

Cleveland, Ohio—Mall Motor Co.; capital stock, \$10,000; to deal in motor cars; incorporators, W. C. Mallin, J. A. Cline, H. M. Siering, M. A. Patterson and J. C. Logue.

Columbus, Ohio—Columbus Distributing Co.; capital stock, \$5,000; to sell oils; incorporators, Frank H. Lawell, Jacob Renner, John A. Howe, Howard F. Ford, C. O. Walker and W. T. Foster.

Cleveland, Ohio—Gordon Square Auto Co.; capital stock, \$10,000; incorporators, C. W. Thomas, W. F. Maurer, John F. Wilson, E. R. Dolin and A. L. Maurer.

Cleveland, Ohio—Clouse Tire & Repair Co.; capital stock, \$25,000; to sell and repair tires; incorporators, Mont Clouse, Alex W. Gillespie, James E. Phillips, Joshua M. Myers and L. Lee Smith.

Cleveland, O.—Beckenbach Auto Livery Co.; capital stock, \$10,000; incorporators, John Beckenbach, P. Kueberle, Lewis Drucker, B. D. Zieve and Arthur A. Nalger.

Cleveland, Ohio—Michigan Oldsmobile Co.; capital stock, \$250,000; to make and sell motor cars; incorporators, Fleming H. Crew, G. M. Gallagher, Richard H. Lee, Frank W. Cadwell and M. A. Marquard.

Cincinnati, Ohio—Premier Auto Repair Co.; capital stock, \$10,000; incorporators, Anton Artner, Esther Stern, Phineas S. Phillips, H. W. Mesloh and August W. Bruck.

Canal Fulton, Ohio—Keller Motor Co.; capital stock, \$10,000; to deal in motor cars; incorporators, A. P. Keller, O. F. Keller, C. W. Keller, Code Keller, Margaret Keller and Hoa Keller.

Dodge City, Kan.—Auto Supply Co.; capital stock, \$20,000; incorporators, T. H. Spaulding, A. J. Jackson and L. B. Jackson.

MOTOR AGE

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March 8, 1917

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ANNOUNCEMENT.

The next issue will contain a feature story on Mont-
gomery, Ala., "Montgomery—Cradle of the Confed-
eracy," in which you may learn of yet another touring
possibility that comes in the cities on the route your
tour follows.

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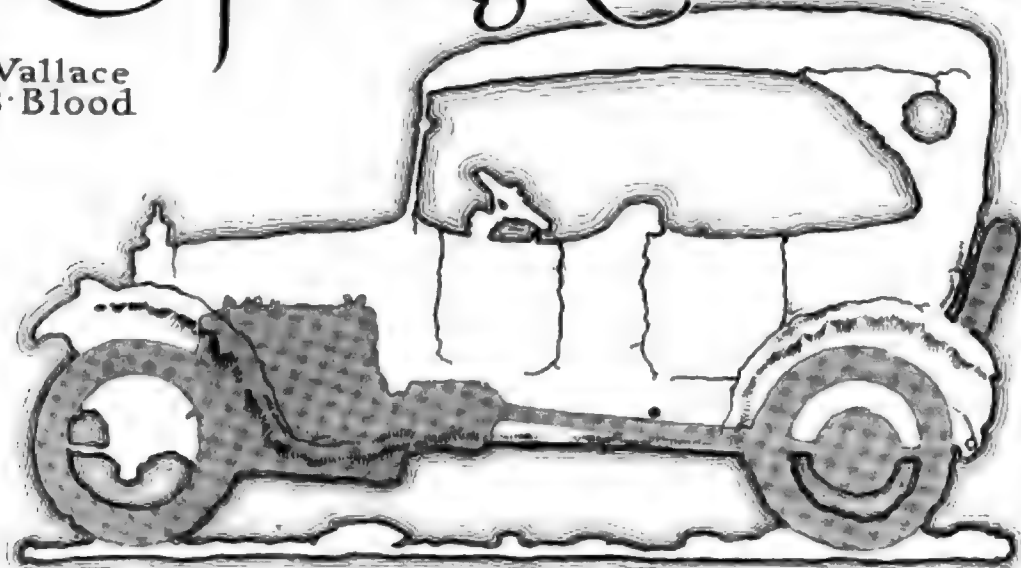
NEW YORK

Ball, Roller, Thrust and Combination Bearings

MOTOR AGE

The Spring Cleanup

by Wallace
B. Blood



SPRING! Should we start this story with a poem? "Nothing doing," says the editor. "You're supposed to tell 'em how to do something. There will be enough music and poetry in the purr of their engines after they have got them overhauled. You tell how to make 'em sing and let the cars furnish the ballads."

That is how a good idea is blasted. I had the first line all prepared: "Spring, spring beautiful spring—" but what's the use. I am going to tell you a list of things to do. These are main things and they have their branches—just like a river. They are as necessary to a satisfactory-operating car as moulting is to a bird. When the snow melts away and the surface of the sidewalk presents itself to the sun, it is indeed a sorry looking sight. It is crusted with the soot and the dirt of a winter—and it needs cleaning. You may have stored your car through the winter. You may have driven it. Whatever you have done, it probably needs a general renovating.

When a car is driven through the winter, the drives are necessarily short. The car sort of gets into the swing of short trips and it is as unfit for long trips as the untrained citizen would be for a marathon run. It needs a rub down and its system needs cleaning out.

You will find on this page a list of twenty things which need to be done to prepare your car properly for the good-

DO THIS Or Have It Done

- 1—Remove carbon from engine.
- 2—Grind valves.
- 3—Clean gasoline line.
- 4—Flush out crankcase.
- 5—Adjust valves.
- 6—Care for clutch.
- 7—Clean and oil gearset.
- 8—Clean and oil universals.
- 9—Clean and oil differential.
- 10—Adjust bearings.
- 11—Adjust brakes.
- 12—Care for tires.
- 13—Renovate chassis.
- 14—Clean and polish body.
- 15—Touch up exposed metal.
- 16—Care for top.
- 17—Care for curtains.
- 18—Look it all over again.
- 19—Learn how to do it—read this story.
- 20—Do it—by all means.

weather driving. Study this list. Maybe you have done a good many of these things before this story has reached you. Maybe there are some left which you had not thought of. It is my guess that you have not done any of them. Am I right?

I am going to put a number in front of the paragraph which introduces the information on each one of these subjects. This will make it easy. Just find the ones

MAP OF MOTOR CAR

Shaded portions show areas which need attention

in the list you want to read about, look at the number, turn to that number, and there you are. But you had better read the whole story.

Before you start work on your car, prepare yourself for the work you have before you. Don't set aside a Saturday afternoon or—may we mention it?—a Sunday morning to do some overhauling and then spend about three-quarters of the time prowling around supply houses after the material to work with.

Buy your material on your way home from work or in the evening, and have it on the spot when you get into those last-summer overalls that the wife had such a time getting the grease spots out of. The very first thing you should look to is your tool kit. After a season of driving tools are lost, loaned or stolen, and you do not realize the deficiency until you have checked up.

Look into the nooks of your car and clean them out. During the winter months, if you have been driving, you have shoved things under the seats and into the tool box with numb hands and a resultant lack of care. It is my guess that your tool box is one grand jumble and you had better clean it out. Go down to the bottom. Those old, greasy rags are not doing any

scraper seems to glide over the surface with which it is in contact. The scratching sensation is due to the scraper cutting the crystalline carbon deposit. Care should be taken not to gouge grooves into the metal. If there is a plug on the other side of the cylinder the scraper should be inserted and the scraping resumed on the other side of the piston. Remember! Don't turn the engine over when the carbon is being scraped. The fine particles of carbon will work their way into the rings and cause trouble. If compressed air is available a blast should be turned into the cylinder every few minutes to blow the free carbon out. A hand bellows will serve if there is no compressed air. You can even use a hand tire pump.

After the piston has been thoroughly scraped, the cylinder head should get its treatment. It is difficult to get a scraper that will suffice for every make of motor. The curvature of the scraper for the cylinder head should be equal to the curvature of the top of the cylinder, or very nearly so. It may be that a pointed scraper will be the only one which will fit the job and it will be a long painstaking process to get all the carbon off with this instrument.

Scraping should continue in all directions until the blast of air does not blow out any more carbon dust. Too much scraping is as bad as too little. If the scraping is not carefully done there will be jagged edges of carbon which will heat from the motor explosions, become incandescent and cause premature firing.

After as much carbon as possible has been removed from the cylinders, a half tumblerful of kerosene should be poured into each one and the engine turned over a few times. The crankcase should be thoroughly flushed out with kerosene, drained and new oil inserted. The valve

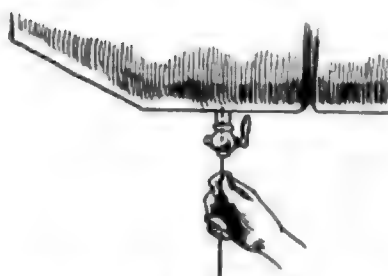


Fig. 3—If you will clean out all petcocks with a fine wire you will find the oil will drain out faster

seats and all other working engine parts should have their kerosene bath and receive a re-oiling.

It is customary to grind the valves after removing carbon by the scraping method.

Another and probably the most modern method of carbon removing is done by the insertion of liquid or carbon removing compound into the cylinder, allowing this liquid to remain in the cylinder and burning it out in the morning. It is performed in exactly the same manner as the kerosene method, although, of course, the reagents have more powerful action on the carbon. In selecting a liquid carbon remover it is well to ascertain that it is composed of materials which, when mixed with engine oil, will not deteriorate this oil as will kerosene. A good test is to wipe a piece of metal with oil and pour a little of the carbon remover on it. If the carbon remover cuts the oil in the same manner as kerosene or gasoline, it is natural to suppose that it will not help things much if it gets into the oil in the crankcase, and it will surely get in, some of it; there is no preventing that.

2 It is not a difficult process to grind in valves. It is a slow process, and is better done the more patient and untiring the

operator is. But don't let them tell you it requires a trained expert or a master mechanic. Such is not the case.

The first thing to do in grinding valves is to separate the valves from the parts which are holding them fast. In practically all engines the valve springs are held in place on the valve stem by a key. To release this key it is necessary to compress the spring and drive this key out. Probably more profanity has been delivered in ovation over this little job of releasing a valve spring than in any other repair job on a motor car. This verbal outlet of bad temper can be directly attributed to the fact that the operator fooled around with his hands first and used his brains afterwards. Do not try to remove that spring without formulating some plan in your head for its removal before you start operations.

Of course, the best thing to have is a tool especially designed for the purpose. There are several very neat little devices on the market that handle this job of valve compressing in commendable style. If you haven't one of these you have got to pry the spring up. Now stop and think it over. Don't try to do it with a file. A file is made of brittle metal, and it does not take much pressure to snap it in two. If it does break and it happens that none of the flying pieces lodge in your eye, you are going to curse—and once you start cursing your efficiency will decrease in direct proportion.

Get a bar of steel. That will not break, and it will give plenty of leverage. If you can get some one to help with the prying you will have less trouble in getting the key out.

Now, we will suppose that you have removed the key without a single curse. You should provide yourself with a valve-grinding compound. Are you going to grind your valves after reading this story? All right, then put that down on a piece of paper. Buy some valve-grinding compound. Lift the valve out of its seat and apply this grinding paste to the rim of the seat. Put on an even coat and don't plaster it all around the surrounding metal parts. Take your time. Cover the tapered part of the valve itself with the compound and drop the valve in its seat.

Now, look on the top of the valve head. You will find a slot cut in there which will take just nicely the point of a screw driver. Did it surprise you? Those slots are in all valves. Put the point of your screw driver in this slot and start business. Now, a man who grinds valves for a living, or part of a living, holds the screw driver between the palms of both hands and twirls the screw driver in the same manner the Indians used to twirl those crude sticks they used to make fire with.

You try this and see how it works. It may be that you are so clumsy at it that the point of the screw driver keeps slipping everlastingly out of the slot. It may be that your natural grace will make you

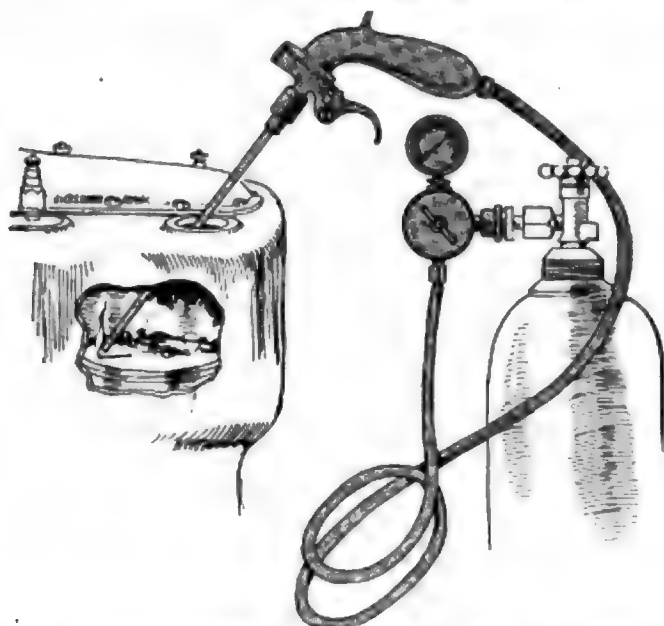


Fig. 4—The oxygen equipment for removing carbon. There is an oxygen tank, a pressure gage, turbine and a trigger valve. A lighted match dropped into the cylinder starts combustion of the carbon

fall into the motion as if you had done it all your life. Now, don't write me and say that it worked fine the first time. I know you're graceful. If it does not work, just go at it with the screw driver held in the regular way in the palm and fingers of one hand, and set yourself for a patient siege of labor.

Do not press down hard on the valve. Do you stop your own razor? You don't push away against the strop until the edge of your razor is round instead of sharp. You can grind a valve seat in 2 mins. by pushing down hard with the screw driver. You can do a lot better job in 10 mins. by pushing easily. Push lightly. After you have ground for a period which, in your mind, is enough to give the seat a surface like a mirror, wash off the compound with gasoline. Be careful now. Don't wash it down into the valve guides or starter or generator or magneto. Put a rag underneath to catch the drippings. If there is a shiny surface over the entire face of the seat and the valve head, the job is done. If there are dark spots, start all over again and grind these spots off. It will take a long time to go over all of the valves thoroughly. You might as well not do the job at all, though, as to do it hastily and poorly. When it is all done wash every bit of compound out of the working parts. Remember that stuff is grinding compound and it will keep right on grinding whatever it gets into.

There should be no play between the valve stem and the guide. If there is, either a new valve or a new valve guide bushing will remedy the trouble. If there are no bushings, a valve with an oversize stem will take up the play, and you can probably get this from the factory. This play later causes air leaks and oil leaks. If any valve spring is much shorter than the rest replace it.

3 You had better clean out that gasoline line. You had better take the carburetor apart and give it a bath. Disconnect the gasoline lines at both ends. Put your mouth over the end and blow. If there seems to be a clog, if your blowing takes more effect than seems necessary, run some soft iron wire back and forth through the pipe. Soft iron wire will follow the curve of the pipe and clean it out thoroughly. Give the needle valve and its seat a careful examination. If either is blackened or burled dress off the irregularities very carefully with fine emery paper. Be careful in this job. A little too much dressing will give an uneven seat.

Flush the bowl of the carburetor and examine all the parts to see if any dirt or gummy substance has adhered to it. In fact, go over the whole gasoline feed system and see that it is absolutely clean. One little grain of dirt the size of a pin head, if it works into some certain place, may stop up the whole system, and you would look and look before you found the trouble.

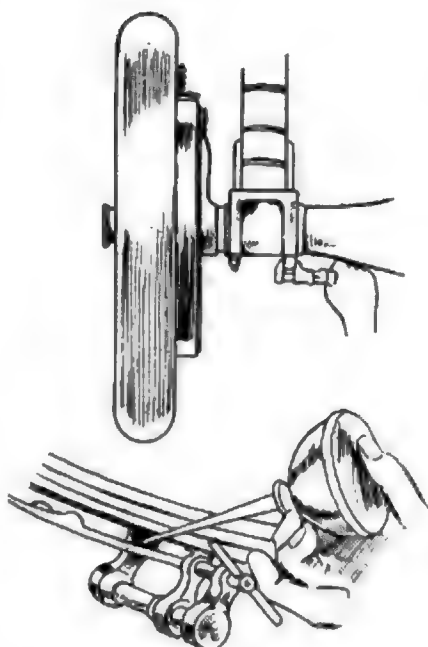


Fig. 5—Tighten the nuts on the ends of all the spring clips. Spread the spring leaves and fill them with oil or graphite

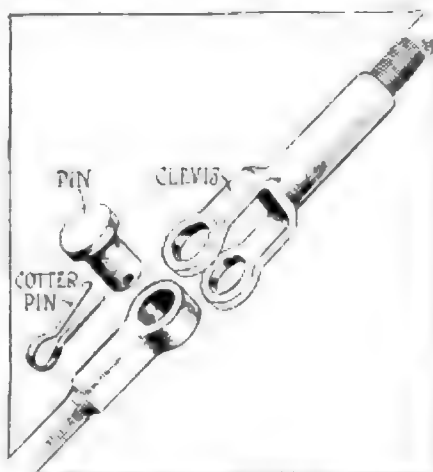


Fig. 6—This is the way to take that yoke apart when you start to adjust the brake rods

4 If you have scraped the carbon you have also drained the crankcase, if you have followed directions. If you have not heretofore drained the crankcase, there is no excuse in the world for leaving the job undone. If you have stored your car for the winter, the oil which you left in it has thickened and the dirt and carbon which had accumulated in the fall driving has settled and lodged on the case. For this reason the flushing should be a vigorous one. Use plenty of kerosene and keep the drain closed. Better to leave the kerosene in over night and drain it out in the morning. When you open the drain cock turn the engine over so that the compression caused by the downward travel of the pistons will force the oil out vigorously. You can even cork the breather pipe and get still more violent discharge of the kerosene.

Be sure that every bit of the kerosene is

drained out. Even a teacupful of it, when mixed with the fresh lubricating oil will so weaken that oil that it will not lubricate the engine properly. Put in a supply of fresh oil and this job is done.

5 MOTOR AGE would be doing a good work if it placed on every page of every issue, in bold type, the words, "Adjust Your Pushrods." I have been called to look at scores and scores of cars which, according to the owners, were not delivering the power they should. These owners professed to have examined everything with a fine-toothed comb and allowed they were completely mystified.

After I had examined a dozen or so, I learned to look to one thing first of all, and that was the adjustment of the pushrods. A man will spend hours doping his engine with carbon remover and adjusting his carburetor to hair-line precision and will start up the street with a clattering set of pushrods that reduces the engine power sometimes as much as 50 percent.

When a valve stem is not just such a distance from the valve lifter, the valve either does not open enough or stays open all the time. Generally it does not open enough. A matter of .010 in. in the lift of the valve makes a world of difference in the power. You simply cannot set them by guess and get a good job. You're not a good enough guesser.

You should provide yourself with a valve-clearance gage, which should be about .004 in. thick. If this cannot be had, use a calling card. Calling cards range in thickness from .0035 to .0045 in. and that is close enough to give a satisfactory adjustment. The calling card or gage should be just a loose fit between the lifter and the stem, touching both parts. Do not draw it down to a tight fit so that it takes a vigorous pull to remove the card or gage. There can be a difference of .001 in. or over by tightening down too much. Adjust every valve the same.

6 Of course, the proper care for the clutch depends entirely on the kind of a clutch you have, whether a multiple-disk, a cone or a dry disk. It is well to say here that a clutch in a car which has been built within the last 2 or 3 years is more or less everlasting and trouble proof. Then, too, the driving public is gradually learning the value of handling a clutch with care. By sad experience they have found the woes in allowing a clutch to slip and jerk and they are handling them more silkily. If you are one of the old timers that abuses a clutch, stop it. You don't wind your watch with a pair of pliers.

The cone clutch should be examined carefully. If the leather is burned down excessively thin it should be replaced. If the leather is still plenty thick, but is crusted with a charred and dirty looking surface, apply a liberal dose of neatsfoot oil and let this soak in. Then, if the clutch slips you

can insert a dose of Fuller's earth or powdered sulphur.

If you have a dry-disk clutch, about the only thing you can find wrong would be the disks themselves, and this is not likely. If the disks are worn down and shiny you should put in new ones, because these badly worn disks will never carry you through the season, and now is the time to make replacements instead of on some sunshiny summer afternoon when you ought to be touring in the country. The same is true of the multiple-disk clutch. An overnight kerosene bath is a good prescription for this type. In the evening jack up a rear wheel, throw the car in gear and, with engine running, let the clutch in and out until the kerosene has squeezed all through the plates. Then, in the morning, drain the oil out and, if it is the oil-bath type, insert a half pint or so of light lubricating oil.

7 The gearset should receive much the same treatment as the disk clutch. Wash out all the grease with kerosene. Be sure that you get it out of the gear teeth. A grease gun filled with kerosene will help in forcing out the gummy oil. Dry the case, thoroughly, after the bath, and insert clean oil. If you are tempted to fill the gearset case with hard grease, you had better read your instruction book or communicate with the factory or a service station first. There are not very many gearsets made which are adapted to the use of hard grease, and a good many of them can be ruined by its use.

The majority of gearsets are made with no adjustment to the bearings. It is a very infrequent occurrence when a gearset bearing becomes loose and then it can generally be attributed to carelessness on the part of the owner in failing to keep the gearbox full of oil. It is well to ascertain, however, whether things are loose, and this can be done by endeavoring to push the shaft which connects the gearset with the rear axle back and forth. If there is any play over a very slight movement the bearings need adjustment, if possible, or replacement if no adjustment is provided.

8 Friend Car Owner, would that you would learn the absolute need of caring for the universals. These devices are such inoffensive looking things that they are slighted and left to suffer alone, like the wall flower at the village dance. Most universals need oiling every month, some of them two or three times a season, and some of them, of the non-lubricating type, need no care at all. Find out what kind you have. If the universal is of the inclosed type, the shell should be removed, the pins taken out and everything cleaned. If there is a looseness in the bearings by all means put in new bushings, or return the universal to the makers and have it repaired. Wash everything out, and fill it with hard grease. Fill it. Don't just put

a dab in. Grease is cheaper than universals.

9 The differential needs its spring cleaning as well as the other driving units. The kerosene flush is equally serviceable here. When you are ready to put in new lubricant, scratch your head a bit and reason it out whether you should use hard grease or flowing oil. There is a very small amount of heat generated in the differential. If you pack in a lot of hard grease the gears are going to cut a path in this grease and run dry. When the heat generated by these dry gears is sufficient it will soften the grease and the gears will again get some lubricant. But this hit and miss oiling is not good for the gears. Use a heavy flowing oil or a light fibrous grease or grease and graphite combination, which you are sure will find its way into the gear teeth.

Bevel gears require occasional adjustment. There are so many different means for making these adjustments in the different makes that we cannot give you any rule that will apply to all of them. If the bevel gears are noisy, this noise can prob-

ably be taken up with the adjustment, although it is possible that the gears are worn, or even improperly cut or misaligned in the first place, so that replacement may have to be resorted to if you want your gears quiet.

The adjustment of bevel drive gears is a compromise. When a car is being driven by the power of the engine, there is a tendency for the gear teeth to separate, to push themselves out from one another. Then when the car is coasting or the brakes are applied, the effect is the exact opposite. Therefore, the gears must be set so that there will be minimum noise, both when driving under power and when coasting. It is a thing to experiment with and you may have to make a number of different settings to get the desired results. You can rest assured that the setting which you find before the adjusting operation is started is not far from right, and it is unwise to make any radical changes. Move the gears a little out and try them. If there is excessive noise when coasting they are too far in. If there is too much noise when under power they are too far out. By this method of cutting and trying you will not find great difficulty in getting the proper adjustment.

10 Test the wheel bearings, front and rear. A good way to do this is to grasp the tires on the top edge with both hands and rock them vigorously in and out. If there is a thumping sensation the bearings are loose. Here is the way to set them:

Remove the hub caps and take the cot-
ters out of the cone nuts. Turn up these cones until they are as tight as they will go, without applying great pressure on the wrench. Then turn them out again slowly, the while spinning the wheel with your other hand. At the point where the wheel just spins free, that is, so that it will rotate

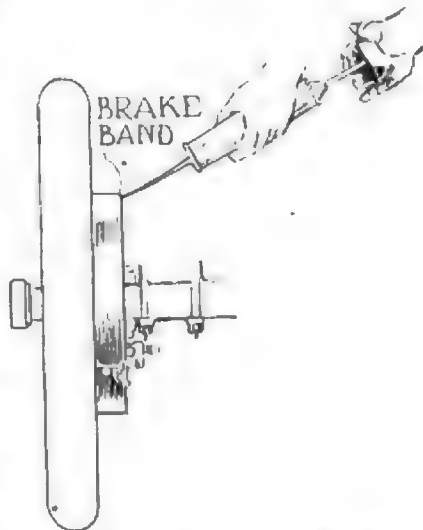


Fig. 7—If the brake bands are gummy with oil, squirt in some kerosene with a grease gun and then add a little Fuller's earth.

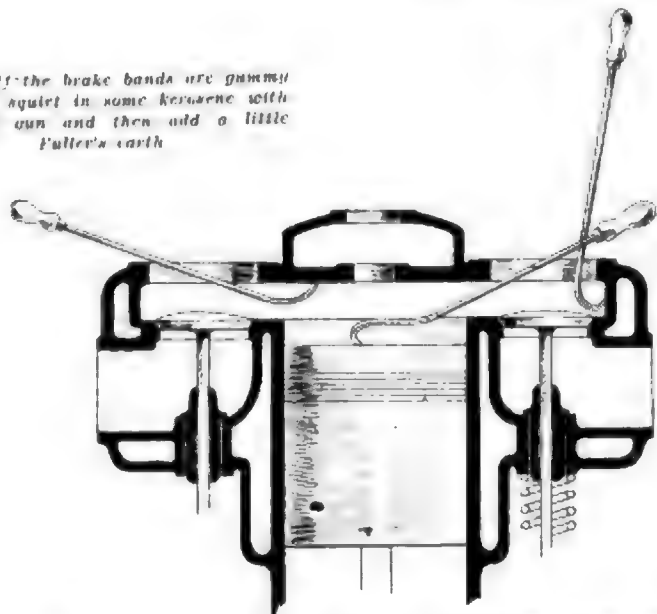


Fig. 8—These are the three kinds of carbon scrapers generally used. Each is shaped to reach various points.

without drag, the adjustment is correct. Do not forget under any circumstances to replace the cotter pins. They are an important part of this adjustment and without them a few miles of driving may mean a seized bearing and a general shredding of the internals of the wheel.

11 The brakes must be adjusted so that there will be an equal pressure applied to each side. On all modern cars is found an equalizing system which is as dangerous as it is useful. Owners get the impression that equalizers will take care of any irregularity of brake adjustment. But such is not the case. You should turn up the turn buckles or tighten the cables, whatever the construction may be, until all brakes are as equally adjusted as you know how to make them. Then set the brake pedal or lever as tight as you can without there being a drag on the brakes. It is well to start the season with as close an adjustment as possible, and it may be that you will not have to touch the brakes again during an entire season.

The way to test the setting is to put the rear wheels up on jacks. Have someone else handle the driving, or do it yourself and have someone else watch the brakes. Get the wheels spinning and throw out the clutch. The service brake should be applied easily. If one wheel stops rotating more quickly than the other, the loose one needs a tighter setting. This operation should be repeated until both sides of the service and emergency brakes take hold at the same time.

12 It is to be hoped that, when you put your car up for the winter you washed all the grease off the tires. Grease is one of the greatest enemies of rubber. If you left the grease on, wash it off now. Use gasoline, and use it liberally until the tires are clean and white all over.

Now go over the tire surface carefully. If you find a cut, no matter how small, even an abrasion, this injury should be treated. There are a good many cut fillers on the market, and it is up to you to select what you wish to use. These cut fillers are really nothing more or less than a rubber compound in a doughy form which may be kneaded with the fingers.

Before applying the filler, clean the cut out very carefully with gasoline. If it is a deep cut and full of sand, scrape this sand out, grain by grain, with the end of a match or the pointed end of a stick. Have plenty of daylight on your work and don't overlook a single grain of sand. The next step is to coat the inside of the cut with tire cement. Do not think that you have to have a puddle of cement in the cut. Too much means that the filler will not bury itself into the cut, but will hang on the cement. Coat every part of the cut with a thin coat of cement.

Then apply the dough. If you want it to work easily, you should break off a piece of dough about the size to fill the hole and hold it in the palm of your hand until the

warmth has softened it. Remember when you were a kid in school, you used to buy those kneading erasers and, when the teacher was not looking you used to form them into all manner of sculpture! You used to hold the eraser in the palm of your hand to soften it before you started your masterpiece. It's the same principle with the tire-cut filler. Work this filler into the cut carefully, and with plenty of pressure. It is well to form the filler to resemble the shape of the cut as closely as possible before putting it in so that every crevice will be filled. The longer you take at this job the better the results will be. Knead it until the cement has become thoroughly hardened.

13 It is our assumption that you have got the chassis and running gear in serviceable condition. Your labors have been more or less accompanied by a general spattering of grease, and your gloves, or hands maybe, have touched about every part of the chassis and left a spot of grease thereon. If this grease is allowed to remain it will serve as a great dust catcher. You should go over everything with gasoline.

Gasoline is selling high right now, just like everything else, and there is no need of being reckless with it in cleaning the chassis. A gallon ought to be more than enough to do the whole job. When you dip your rag into the gasoline and remove it, hold it over the can and give it a little squeeze so that it will hold what gasoline is in it, and not spill it all over the floor.

14 The body should be thoroughly and carefully cleaned. You must bear in mind that very small particles of grit, so small that your eye will not notice them, will put an ugly scratch in the body if rubbed across it. Therefore, determine that you will clean and wash the rags you use very frequently while doing the body scrubbing. A good cleaner is a soap which is put up by a number of different makers, which is either lathered on or coated on and allowed to dry and then rubbed off.

A hose washing with a sponging down with soapy water is also effective. Keep things clean. Wash the sponge out often. Wash out and ring out the rags often. It is worth while.

Once washed the body should be dried with a chamois or with very soft cloth. Here again cleanliness must be observed because the washing does not always remove all the grit. Now, for the polishing. There are liquid polishes and solid polishes. The wax polish is a very good and permanent medium. The proper application of wax polish takes an abundance of elbow grease, and the more elbow grease you use, the better the job will be.

There are liquid polishes which are dabbed on with cloth in the same manner you polish furniture. Then, too, there are the spray polishing outfits, with which you spray liquid onto the body like you spray fruit trees. You may have tried out the va-

rious types already and settled upon some one which you think gives the best results.

15 If the body has become scratched, if the paint has chipped off, if parts have become exposed and rusted, these should by all means be retouched before starting into the driving season. There are several good retouching compounds on the market. A quick-drying enamel is a good thing to use, because it flows evenly and, once applied, it is hard to detect where the retouching has been done. Do this job carefully. Don't plaster the paint around where it does not belong. Use a pointed brush so that you will cover only the area which needs covering.

16 A season's use of a top, especially if it has been carelessly handled, has brought about some disruptions in the fabric which will end in a wrecked and unsightly top, if not promptly taken care of. If there are any tears in the fabric sew them up or have someone that knows how sew them up. If the top is discolored and inclined to be brittle, go over it with a top dressing, and let the dressing soak in. This is a good thing to do regardless of the condition of the top. In fact, I advocate it for use on new cars. When you buy a pair of shoes, the first thing you do before you go out into the wet is to have them shined. Do the same thing with the top. Preserve it with a good dressing.

17 Those side curtains have probably been kicking around in a dusty tool box, and the sight of them staggers you. It is an easy matter, however, to get them back into shape again. Go over the fabric with top dressing, first having washed it with soap and water. If the lights are broken, put in new ones. There are several companies offering curtain lights for any make of car. If they are just dirty and stained, clean off the mica with a weak solution of vinegar.

18 Now that the job is all done, look it all over again. Go over everything that you have worked on. Make sure that you have omitted no bolts, nuts or cotter pins. Examine the now dry body carefully and see that there are no spots you have missed. Try to make it a new car. Don't leave anything undone.

19 You have now read this story. Or maybe you have taken our suggestion and turned to the numbers you were interested in, and this paragraph, No. 19, is the first one you have read. If it is, I say, start back and read the rest of it. Then take this MOTOR AGE issue to the garage or workshop and go through the overhauling with the story before you.

20 This is the last paragraph. You have read the story and you turn over the page to something else. Put a marker in page 5 and then when you have gone through the whole issue, turn back to that marker. If you don't go out and fix up that car you are going to feel guilty. Do it—by all means.

To Make Palmer Tire

New Company Will Manufacture Latest Development of Cord Idea Inventor

Controls Patents on Automatic Machinery and New Type

CHICAGO, March 5—John F. Palmer, Riverside, Ill., inventor of the cord idea in pneumatic tires, has organized a company for the manufacture of his latest development in this type of tire. The factory is at St. Joseph, Mich., has 70,000 sq. ft. area and is of modern construction. The concern is called the Palmer Tire & Rubber Co. and will manufacture the Palmer flat, cable, cord tire, a new development of the cord construction. A new tube of Palmer design also will be made. Mr. Palmer's twenty-three years of experience in this field promise interesting construction. The company is capitalized at \$500,000, and the officers are as follows: J. F. Palmer, president; C. W. Bully, Chicago, vice-president; W. E. Bryan, Chicago, secretary; Marshall D. Wilbur, treasurer. G. H. Bird, of the Bird-Sykes Co., Paige distributor, Chicago, is manager of salesmen.

G. W. Bully was formerly president of the Mercury Mfg. Co., Chicago, and recently resigned from that company to take charge of the manufacturing department of the new factory. Mr. Palmer controls the patents on his new type of cord tire and also patents on the automatic machinery for its manufacture. A complete description of the new tire will be published in an early issue.

RESIGNS FROM WILLYS-OVERLAND

Toledo, Ohio, March 2—H. T. Dunn, vice-president of the Willys-Overland Co., has resigned, his resignation to take effect May 1. His withdrawal is due to the increases in business and plans for development of the Fisk Rubber Co. and the Federal Rubber Co. Mr. Dunn is president of the two rubber companies and finds it necessary to devote his time to them. He will remain a director of the Willys-Overland Co.

1000 AIRPLANES YEARLY

Detroit, March 3—A group of Detroit inventors, working in conjunction with T. W. Benoist of the Benoist Aeroplane Co. of Sandusky, Ohio, are planning the organization of a company in Detroit to manufacture aeroplanes on a large scale. The Detroiters interested are P. W. Murphy, S. Smith and S. Peplenski, expert mechanics employed in various motor car factories.

The Benoist company is the second largest in America, being surpassed in output only by the Curtiss company. The plan is

to combine the Benoist aeroplane specifications with a new 18-cylinder, cam drive, 120-hp. engine developed by the Detroit men. It is hoped to make at least 1000 planes a year in the Detroit factory. The new planes will carry from two to eight passengers and sell at prices ranging from \$5,000 to \$11,000. If the company can be organized within the next month and a plant built in time, it may compete for a part of the Government business incidental to aeronautic preparedness. The company also plans to operate the passenger and mail transportation system between Detroit and Cedar Point.

FORD SHIPS TRACTORS

Detroit, March 2—Two tractor plows have been sent to England by the Ford Motor Co. as an experiment. It has been reported that this tractor plow can turn over about 6 acres of soil in 8 hrs. A recent news dispatch from England states that, according to Sir Arthur Lee, director general of food production, England will import 2000 American tractor plows soon.

AUTO PARTS RE-ORGANIZED

Chicago, March 2—The Auto Parts Co., Chicago, has been reorganized and new capital brought in. The new list of officers includes A. H. Skogland, president; F. D. Symonds, first vice-president; J. B. Coulser, second vice-president; H. W. Binnie, treasurer; A. C. Johnson, secretary; G. G. Schoneberger, general manager. R. M. Symonds, the former president, sold his interest.

FISK RAISES PRICES

Chicopee Falls, Mass., March 2—The Fisk Rubber Co. has announced an increase of 10 per cent in the price of its tires. A general tire price increase has been pending for more than a month and other increases are expected. Most of the companies raised tire prices from 10 to 15 per cent Jan. 1.

GOODRICH TIRES HIGHER

New York, March 5—Moderate increases in tire prices have been put into effect by the B. F. Goodrich Co., Akron, Ohio. With the announcement that Fisk prices were to advance, made last week, a general rise was expected all along the line. Interviews with the New York offices of the major tire manufacturers today revealed that no sharp rise in prices is likely at the present time.

The Goodrich schedule on casings is now \$11.65 for the 30 by 3, formerly \$11.35; \$15.10 for the 30 by 3½, formerly \$14.70; no increase in the \$17.70 price for the 32 by 3½; \$25.30 for the 34 by 4, formerly \$24.60; \$36.25 for the 36 by 4½, formerly \$34.20.

A slight increase was also made on the tubes which are now priced at: \$2.75 for the 30 by 3, formerly \$2.70; \$3.40 for the 30 by 3½, formerly \$3.05; \$3.50 on the 32 by 3½, formerly \$3.40; \$4.70 on the 34 by 4, formerly \$4.25; \$6.05 on the 36 by 4½, formerly \$5.60.

Cooper Wins at Ascot

Sweepstakes Run in Los Angeles Proves Another Cooper-Pullen Battle

Disabled Frontenac Prevents Rickenbacher Trying Course Record

LOS ANGELES, Cal., March 4—Special telegram—The belated George Washington sweepstakes run at Ascot speedway today was another Cooper-Pullen battle which has become rather chronic on the local speedway. Cooper in a Stutz finished the 100 miles in 1 hr. 27 min. and 46 sec., his average being 68.35. Pullen's Mercer was second, the time being 1 hr., 28 min., and 18 sec., and Toft was third, time, 1 hr. 30 min. and 38 sec. Pullen's average was 67.95 and Toft's 66.19 m.p.h. Cooper won \$3,000 of the \$5,000 prize.

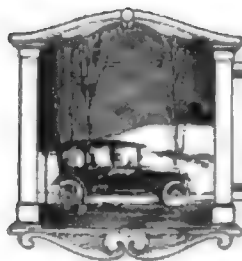
Among the 20,000 spectators were many who expected great things of Joe Boyer and his Frontenac, which had been heralded as speedy. The Frontenac had the pole and led the field at the beginning, but was soon displaced by Cooper and went out at 20 miles with a broken wrist pin. Boyer almost wrecked the car in practice a few days before the race and a new set of pistons was installed immediately before the race began, which gave him no opportunity for working them out.

The field originally numbered twelve starters, but one driver was excused because of injury to his eye. Cooper set the pace and took things easy up to the twenty-eighth lap. Pullen blew a tire while driving high on the curve and while stopping at the pits to change, Toft went into second place, but by the end of forty laps the Mercer was second again, the Durant was third. In the fifty-ninth lap, Cooper changed three tires, Pullen going to the lead but losing it again two laps later when he had to stop for tires. At this point Cooper again took the lead and kept it to the finish.

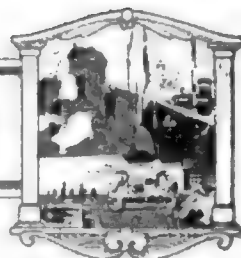
Eddie Rickenbacher was billed to attempt to break the course record of 45 sec., set by Oldfield in a Christie. He expected to use the Frontenac, but since this car was disabled the event was canceled. The cyclecar race which opened the program was won by Morgan Snyder in 12 min. and 28 sec. The final Ascot race of the winter season will be run March 25.

ITALIAN RACE DRIVER KILLED

Turin, Italy, Feb. 5—Giovanni Marsaglia, motor car engineer and race driver, was killed yesterday while making a trial flight as passenger aboard an Italian army aeroplane. The machine was a new type carrying a motor for which Marsaglia was partly responsible. On coming to the ground after a height test the machine got out of control and fell a complete wreck.



EDITORIAL PERSPECTIVES



The Season of Cleanliness

EVERY 24 hours, or oftener, you go through the process of a physical cleanup, the shower and the general bodily renovation. Make the 24 hour period a 365 day period and make your physical self your car and there you have it. That car needs its periodical cleanup just as much as you do. It is all right to wash its hands and face four or five times a season, but at least once a year it should have a thorough in-and-out renovation.

■ ■

THE proper time for the general cleanup is in the spring. If the car has been stored all winter it is stiff in its joints and sodden in its bearings. Its body may be encrusted with the accumulations of a winter's dirt. If the car has been driven all winter it has received only that care which chilled hands and an icy disposition would permit. Reaching home from town, benumbed and stiff, you have let that bearing squeak, rather than get out an oil can with your frigid hands.

■ ■

WINTER driving is one of short trips. The car gets out of the habit of long-distance work, bolts loosen, springs squeak, the tires have been slashed by the icy roads. Starting into a vigorous touring season with such a shaky piece of mechanism is suicide for tires, comfort and the pocketbook. Unless there is something radically wrong with the internals of a motor car, the average man can with a due amount of patience, perform every operation which will put it in first class condition.

■ ■

GRINDING valves is not a difficult task. Removing carbon from the cylinders is not a difficult task. It requires no amount of mechanical skill to re-oil working parts, adjust brakes and wheel bearings. It requires nothing more than painstaking care and a good deal of perseverance to make the old body look almost like new.

■ ■

THE accessory makers are doing everything in their power to make things easy for you. They are putting up complete sets for the repainting of your car. All you have to do is to buy one of these sets, locate your car in a place free from dust; open the case and go ahead with the work. All of the material is there. They are mixing your valve grinding compounds for you, saving the inconvenience of doing it yourself. They are offering you valve-grinding tools that minimize manual labor to a surprising extent.

■ ■

THINK of this satisfaction of having a bright, tight and clean car to start the season, and then, before the thought leaves your head, get busy. The man that puts it off now is the one that will not do it at all. The atmosphere of spring has a sort of depressing effect on ambition, you know, and if you wait until then you will never clean up. The air is still crisp. Get busy!

Wanted—Permanent Roads

“GOOD ROADS” has become a slogan, but it is sadly in need of revamping. What we need is not good roads, but BEST roads! Why should a county, state or the nation throw money away on highway construction that has not the rudiments of good business; spend money for roads that soon are rutted, the surface washed into the ditch, and that last but a season or two at the most? Our whole system of roads, with the exception of an almost insignificant fractional part, is inadequate. If the Romans and Napoleon had built roads like we build them in this country, would they have withstood the strain of ages and been a monument to Italy and France that they are to-day?

■ ■

HAD it not been for the advent of motor cars it is difficult to imagine what the roads of this country would be today. More motor cars are coming, and more commercial vehicles. The wise manufacturer in laying out a plant makes provision for expansion. Are the road-builders of the country far-sighted enough to build roads that will have a permanent character, so that when traffic increases, as it is and will be doing every year, the roads will be adequate? We do not need to have roads laid out like a railroad grade, that is, less money need be spent for grading and filling; but we do need a surface that will be permanently hard and require very little maintenance. Present-day vehicles can negotiate an undulating road, it gives more pleasure to ride over such a road, and there should be no objection to moderate grades.

■ ■

ONE county in California has spent \$17,000,000 for permanent roads—in this instance, cement. It probably is out of the question for all counties to do likewise, but if we are to put money into roads at all, then we should make the trunk lines of a permanent character. Ultimately, great motorized transportation routes will be necessary, and we should have the right kind of highways to handle this class of traffic. The need is for year-around main roads; not gravel roads, not macadam roads, not dry-weather roads, but permanent, hard-surfaced roads that will not be impassable in wet weather. Not only will such roads be an asset to peaceful pursuits of commerce, but they would be of great strategic value if this country should be at war with other nations.

■ ■

ROADS are the nerves which bind the country together and the condition of these roads reflects the strength or weakness of this bond between communities. Roads into a city help the city business man. It is the duty of the business men who benefit to put something back on the roads. Owners of city lots share the expense of paving the street at so much a front foot. Why should not the farmer pay a given sum per front foot to build permanent roads that will enhance the value of his land?

Where Will We Park?

IN THE larger cities the parking problem during the last season has been responsible for depriving thousands of urban tourists of the use of their cars. They have found it impossible oftentimes to find a place to leave the car during business hours that even approached a convenient distance from their work. Only the early birds were fortunate enough to find space for parking at the curb without the dangerous and vexatious negotiation of blocks of congested traffic. They have preferred the city transportation systems. Chicago and one or two other cities have provided municipal parking spaces, but there cannot be enough of these to have one convenient to more than a fraction of those who might use it.

■ ■

THIS year conditions will be worse. Motoring organizations and traffic officials are wrestling with the problem. Congestion of traffic on the busy streets will force the cities to decrease the space allowed for curb parking. Where will we park our cars?

Driver's License for Visitors

Arizona Proposes Law to Make Non-Resident Tourist Pass Examination

PHOENIX, Ariz., March 3—According to a bill being considered in Arizona, all tourists would have to obtain a driver's license before crossing the border or be liable to arrest for breaking the law.

A license tax for motor cars based on the weight of the car, non-transferable licenses for all drivers, examination of chauffeurs by a mechanic and the county physician before issuance of a license to drive, and a reciprocity arrangement as regards the life of licenses of cars from other states are some of the features of the motor vehicle code introduced in the legislature. The bill, which combines several features from the motor vehicle codes of other states, was compiled by Con P. Cronin, state law and legislative reference librarian.

Weight Would Determine Tax

The license tax for all cars would be at the rate of 50 cents a 100 lbs., the weight of the car to be taken as delivered by the manufacturer. Trucks would be charged for at the same rate, with an additional charge of 50 cents for each 100 lbs. carrying capacity. jitney buses and stage line motor cars would pay a license tax at the rate of \$1 a 100 lbs.

Another change in the license tax is that it is to be computed on a monthly basis; that is, the owner of a car shall pay the license tax for the actual number of months for which the license is issued and not for a longer period. Under the present law license charges are either for the entire year or, after July 1, for six months. Under the new law the purchaser of a car Dec. 1 need pay only one month's fee for the remainder of the year instead of six months' license as at present.

Two provisions in the proposed code are intended to make it extremely difficult for the thief to operate. One is the general driver's license, which when issued is non-transferable; another is the provision making it a felony punishable by \$300 fine and 1 year's imprisonment to alter or destroy the manufacturer's serial number or any other distinguishing number or mark. No driver's license is to be issued to any person under 16 years of age, the bill provides. It is this general driver's license that would affect the tourists.

RECIPROCITY IN A TANGLE

Trenton, N. J., March 3—Because the roads of New Jersey are used by motorists from other states in a proportion to Jersey's use of the highways of these other commonwealths greater than 100 to

NEW JERSEY RECIPROCITY

1, the Garden State has decided to have and enforce what is probably the most comprehensive set of motor vehicle laws in existence.

What Law Says

The Jersey laws provide that motor vehicles from states granting reciprocal privileges may be driven in New Jersey "during a period not to exceed 15 days in each calendar year, or on two or more occasions not exceeding in the aggregate the period of 15 days in any such year," without obtaining a Jersey license for car or driver; and that "each day or part of a day . . . shall be considered as one of said 15 days."

ARIZONA MAY SEARCH TOURISTS

Phoenix, Ariz., March 2—Motorists desiring to cross Arizona may be stopped and searched at the state line to prevent their bringing any intoxicating liquor into the state, if a bill introduced in the legislature becomes a law. The measure, which creates a state police force to patrol the roads,

is designed as a prohibition measure and has the united support of the temperance forces. There would be twenty rangers, commissioned by the governor and acting under orders from the captain of the state police. The bill has been reported favorably in the lower house, and there is every indication that it will become a law. In case it does, woe to the tourist who has anything "on his hip" or, worse yet, tucked away under the seat of his car. But to the law-abiding motorists the state police, it is pointed out, would often render invaluable aid, not only by assisting him in case of accidents but in directing him as to the best route.

MOTORISTS TO HAVE WIRELESS

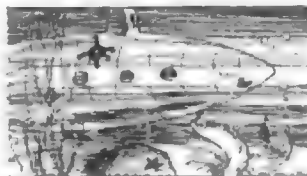
New York, March 3—The American Automobile Association has announced the perfection of a wireless telephone which can be used on motor cars whether they are standing still or running 50 m.p.h. The device is designed for motorists who may plan trips into such territory as the American desert and want to be prepared to summon help should they get into trouble.

The Kick in Gasoline

by Lou E. Cole

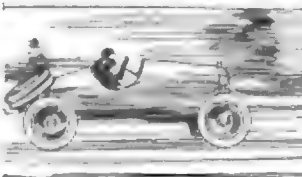
The King of Kings on the earth today.

Without question, or doubt, am I.
O'er land and sea, I hold full sway,
And shall, as long as the milky-way
Can be traced in the starlit sky.

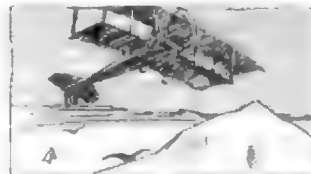


I prowl the caverns, deep and dark,
With a quivering hull of steel;
Light up the gloom with a radiant spark
That charms the eye of the startled shark
As he slips by the metal keel.

I drive the eagle from his cliff,
Through the clouds, on wings of fear;
The gull from its haunts in the rocky rift,
And laugh, as they dodge, turn, wheel and shift
To escape when I'm drawing near.



I am the life, the breath, indeed,
Of the strong and swift machine
That takes the place of the halting steed,
On my whirling wheels of matchless speed;
Me? I'm the KICK in Gasoline.



To Import Racing Cars

American Speedways Association Arranging to Bring Sunbeams and Fiats

Rickenbacher Probable Driver and Manager of English Car

INDIANAPOLIS, Ind., March 5—Addition of four foreign cars to the American racing contingent for the 1917 season was partially assured by the announcement made to-day at the meeting of the American Speedways Association that definite arrangements for the importation of two Sunbeams and two Fiats were completed. It is understood that the speedways as an association will be responsible for bringing the cars and their drivers to this country, presumably guaranteeing their expenses and a pro-rated division of these expenses is to be made among the speedways, based on the number of miles the cars are raced upon individual tracks.

Announcement that the two Sunbeams are to appear under the sponsorship of the Speedways Association seems to show that Weightman, the millionaire California sportsman, who hoped to get two and perhaps three of the English cars through the efforts of Rickenbacher, was unsuccessful, as it is not believed that there are five cars of this make available. This is strengthened by the fact that Rickenbacher is slated as a probable driver of one of the Sunbeams for the Speedways association and manager of the Sunbeams.

As announced in January, the drivers for the two Fiats probably will be Jack Scales and Earico Cagno. These men have been connected with Fiats for years and drove for them in the last European road race—the French Grand Prix of 1914. Cagno can boast of a victory in the Targa Florio cup races, the speed classic of Italy.

The four European cars will be shipped within the next thirty days so that they may participate in the opening meet of the season, New York, May 19. The deal with the Fiat factory was closed by W. F. Bradley, MOTOR AGE's special European correspondent and manager of the victorious Delages that took first honors in the 1914 Indianapolis race.

Timing and scoring of all races will be done by a crew of expert timers and scorers which will officiate at all meets, it was decided by the association. Two electrical timers are to be purchased.

DUNHAM TO BRING OUT TRACTORS

Detroit, March 5—George W. Dunham, recently elected president of the Society of Automobile Engineers, has perfected a farm tractor that will probably be placed on the market in the near future. It is reported that Mr. Dunham's tractor has

proved so successful in its test as to interest many prominent capitalists, and it is probable that a company will make and market the tractor in the near future.

Mr. Dunham is one of the men who have gained leadership among the engineers of the motor car industry. He designed the first Hudson car, had a prominent part in developing and perfecting the four-cylinder engine of the Oldsmobile and later was the head of the engineering department of the Chalmers company as vice-president in charge of engineering and director. He has operated as a consulting engineer for the last two years but has devoted most of his time to the study of the tractor, and Detroit engineering workers believe that with his vast experience he is likely to set a new standard in this field.

SPEEDWAY IN TROUBLE

New York, March 6—Special telegram—The Sheepshead Bay Speedway Corp., which built the 2-mile board track speedway is in financial difficulties and has called a meeting of its stockholders for March 21 to discuss plans for reorganizing. The trouble is connected with a mortgage of \$2,040,000 on real estate. A foreclosure of this is under way. There is over \$50,000 interest due on the mortgage. The trouble goes back to the building of the speedway, when construction work greatly exceeded all estimates. There was not sufficient capital at any time, and the two years of racing were not financial successes.

COLE PRICE UP \$100

Indianapolis, Ind., March 6—The Cole Motor Car Co. will advance the price of its touring and roadster models \$100 on April 1. A similar advance was made Jan. 1 when the price was put at \$1,695, which now becomes \$1,795.

KISSEL ADVANCES

New York, March 2—The Kissel Motor Car Co. yesterday advanced \$50 on the 6-42 models and \$100 on the Hundred Point Six models. The touring Sedan now sells at \$1,735; the Hundred Point Six touring car at \$1,295, and the De Luxe 6-42, seven-passenger, at \$1,750.

KARDO PATENT UPHELD

Cincinnati, Ohio, March 6—The Kardos front axle patent has been upheld by the United States Circuit Court of Appeals which declared it infringed and upheld the validity of claim 1 of patent No. 753820, granted March 1, 1904. According to the decision the decree of the lower court in the suit of the American Ball Bearing Co., against E. B. Pinch, a former Cleveland Chalmers representative, is reversed. The decision of the lower court held the Baker patent void, upholding the prior art claims of the defense from which the American Ball Bearing Co. appealed. The patent has to do solely with the means for mounting and turning the front wheels of motor cars.

Plans 250-Mile Race

Event at Windy City for June 9
Not a Championship—
\$20,000 Hung Up

Non-Professional Contest for 200-In.
Cars Probable Curtain Raiser

CHICAGO, March 6—Plans for the first race of the Chicago season were announced yesterday by the Speedway Park Association. This has been set for June 9 and will be for a distance of 250 miles with a purse of \$20,000. The event will not be classed as a championship event as the American Automobile Association has decided to allot each track only one of the championships and the Chicago number is to be reserved until later in the year. This race will be limited to 300 cu. in. displacement, but as a curtain raiser it is planned to stage a 100-mile race for non-professionals in the mornings, limited to cars of 200 cu. in.

After two years of experience the Chicago management has learned not to wait until the last week before making its plans for handling the crowds and will establish 1000 branch ticket agencies at various places within a 100-mile radius of Chicago.

Several trials have been made of the Chicago track so far this year, and it has been found in fine condition. Fred Duessenberg has used the oval for testing his new engines and reports that the track is as fast as new. Webb Jay, who has put a Fageol through its paces, declares the track seems to improve with age. The only repairs contemplated consist of repainting the stands and garages and rerolling the infield as soon as the frost is out of the ground.

FIRE ATTACKS STUDEBAKER

Indianapolis, Ind., March 5—Fire of mysterious origin threatened the entire plant of the Studebaker Corp. Saturday afternoon and destroyed the assembly room, which contained 200 cars. Lack of water pressure prevented early control of the fire. The loss is estimated at \$30,000.

KISSEL TWELVE SOON

New York, March 2—The Kissel Motor Car Co. will start active production of its twelve in about 2 weeks. The car will sell at \$2,250 for the regular touring bodies, and \$2,650 with the All-Year Sedan.

The motor will be 2 $\frac{3}{4}$ by 5, with overhead valves. Other features include force-feed oiling, multiple disk clutch, Delco ignition, Stromberg carburetor, both internal expanding and external contracting brakes, underslung three-quarter elliptic rear springs, vanadium springs on both front and rear, Goodyear tires, and Firestone demountable rims, with two extra rims.

In the Home of the Real Americans

Arizona, Where Tepee Prevails

Just a Forerunner of a Section to Be Treated
More Fully in the Touring Issue, April 5

BACK in the stirring days of prairie schooners no one relished Indians and those intrepid pioneers fared forth with a prayer on their lips that none would be sighted. To-day, when the twentieth century means of transportation takes you down through the Southwest, you would be disappointed if in making the trip you saw no Indians. Thanks to our Government there are reservations—many of them in Arizona and the Southwest—where the Indians live, some in the more modern way, some in adobe huts, some in tepees.

First of all let us assure you, should there be among those who read this some who think the Southwestern Indian is no more civilized than back in the days of 'forty-niners, that you court no danger from being scalped by directing your itinerary down the once moccasin-trod paths that have become highways. If the writer did not know that there are people—car owners with thoughts of transcontinental touring in mind—who labor under the impression that the Indian is an element of danger to one crossing the western country on the way to the Pacific coast, the foregoing sentence would not find place in this brief synopsis of what there is to be seen in Arizona. Last summer I was shown at least a half dozen letters in a certain newspaper office of a Colorado city, all of them written by people in the East, in which inquiry was made as to whether there was danger from Indians along the southwestern roads. This may sound absurd, but nevertheless it is true.

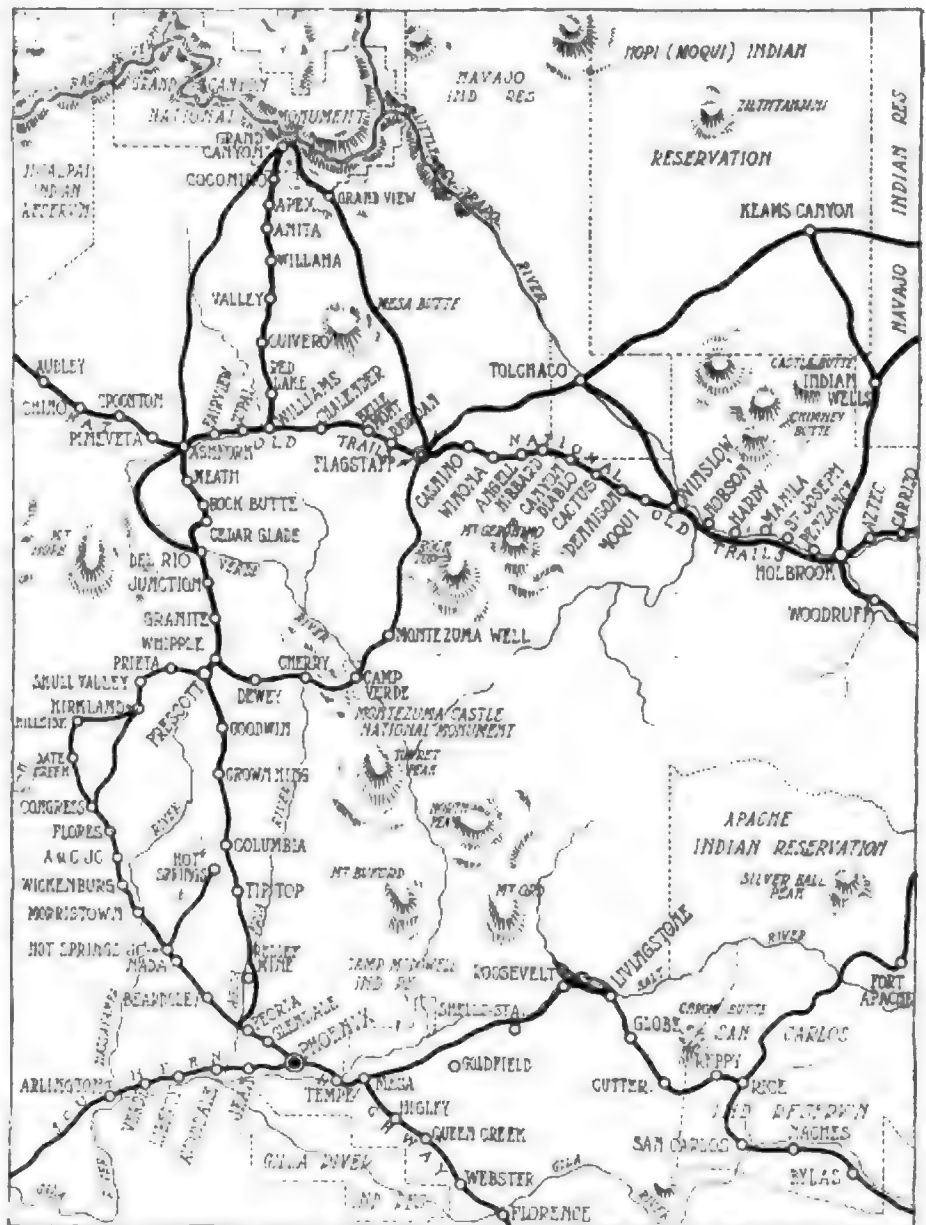
Probably one of the nature freaks of Arizona is the Petrified Forest to the east of Holbrook. Why the giant trees should have gone to sleep—that in a way is what they appear to have done—is puzzling. These trees are not criss-crossed but lay generally with their tops to the South. What laid them low is not known; it may have been a cyclone or a submergence. These forests cover many thousands of acres and are in five separate tracts. These trees truly represent God's acre for they live again in adamant and agate of every conceivable color. Don't get the idea that these trees are standing; they are prone on the ground, some of them partially covered, but still retaining, in many cases, their bark. Annular rings plainly show how old they were at the time they ceased to grow. So varied and bright are the colors it seems as if rainbows had become

entangled and forced to remain on earth.

Nature's master work—the Grand Canyon—is found in Arizona. Here color is king. So many have attempted to describe the ever-changing, deepening shadows that run the full gamut of color combinations, and admitted their weakness in the use of superlatives, that the writer begs to be excused from a description. The Grand

Canyon is referred to as a fifteen-by-two hundred-mile paint pot, the bottom of which is a mile below the top rim. The canyon is off the main through route to the coast, but can be reached over good roads.

Next week we will tell you briefly of another section that will be dealt with more at length in the Touring issue, April 5.



Roads in Arizona which lead through Indian reservations and to the Grand Canyon

PROSPERITY AT OMAHA

Wealth of State Reflected in Sales at Annual Show

OMAHA, Neb., March 3—The Omaha show is the largest small show of the season. Prosperity and good weather are the reasons. It is the twelfth annual show, and 218 cars, trucks and tractors were on exhibit this week. Twenty-six of these were closed cars, eighty touring cars, thirty-five roadsters, seventeen chassis, seven electrics, fifty trucks and three tractors.

Added Space Not Enough

The Omaha association added 10,500 sq. ft. of floor space by a temporary annex to the auditorium this year, but many dealers were turned away, and it was impossible to exhibit accessories at all. Though eighty different makes of gasoline cars and three different makes of electrics were displayed, there were only forty-five car exhibitors. Most of the dealers here handle two, and often three, makes. Nebraska wants touring cars, and Nebraska dealers are showing the cars that sell. Therefore, touring cars were in the majority.

The decorative scheme of the show was good. It was styled "Hawaiian," but it was good anyway. Green and white were used. The sales of the show were more important than the decorations, however. Walking through one could see sales in all stages. Most of the purchasers wanted to know the specifications of the car before buying. Many of them are farmers and have owned other cars, which have made them car-wise.

Governor Was Visitor

The governor and members of the state senate and house of representatives came from Lincoln to attend the show yesterday. Under an invitation extended by the dealers' association, both the senate and the house of representatives voted to adjourn for the purpose. This is doubtless the first time any state government has officially recognized the importance of the motor car business.

Nebraska's prosperity can explain any display of selling ease in the state. The thirteenth state in area, Nebraska last year was fifth in crop percentages and fourth in total crops. The percentages are taken in ratio to the population, 1,250,000 for Nebraska.

The value of the thirteen principal farm crops in Nebraska last year was \$343,655,000. About one-third was corn and one-fourth wheat. Nebraska live stock last year numbered 5,331,010 head, valued at

FARMERS WANT CARS

\$244,573,708. Bank deposits in the state total \$340,717,000—an average per capita of \$286.62. These bank deposits have increased \$155,171,000 since 1910. Building and loan association resources in the state are \$47,917,847.

The state now owns 100,534 cars, last year it was 59,140. The gain in car ownership during 1916, 41,394, is more than the total number of cars owned in the state in 1914. Comparative figures from other states, where the total registration is above 100,000 cars, show that in the number of cars per capita Nebraska is headed only by the state of Iowa. In Iowa the population per car is 11.2, and in Nebraska 12.37.

Cheaper Cars in Majority

The motor cars sold in 1916 were of the less expensive type. This indicates that those somewhat lower down in the financial scale are buying motor cars. Farmers are buying them largely on account of the nature of the country, which is rolling and often sandy. But in the cities the same condition holds, for different reasons. People of fairly modest means, as the term is considered in Nebraska, are buying motor cars. Almost every small business man has his car. Practically every retired farmer who is now living in the city has one. Mechanics, tradesmen, policemen, even newspaper reporters, are riding in their own cars. And the conservatism which has amassed the wealth which Nebraska boasts today makes the tendency that toward the less expensive car.

This does not mean that there is no market here for high-priced cars. Far from it. The dealers and distributors of high-grade cars are doing big business. They are flourishing. The Pierce Arrow, the Packard, the Cadillac, the Stutz, all are common enough sights on the streets of Omaha and of other fair-sized cities in the state. But when you see one of these you can be sure the owner is able to support a flock of them if he desired.

Trucks are common, but there is still a great field for this business. The larger industries in Omaha are about half motorized, department stores almost wholly so and small dealers largely so. Farmers are taking to light trucks somewhat and to heavy trucks in smaller degree.

The tractor situation is unique. Though the business in this territory is still in its

infancy, it is an exceedingly lusty infant. And it is being cultivated almost exclusively by the farm implement trade. Motor car dealers and distributors appear to be so busy handling pleasure cars or commercial vehicles, according to their respective lines, that they have neither the time nor the inclination to take on tractors.

As an example of the growth of the tractor trade here the tractor school conducted by the International Harvester Co. at the show may be cited. Omaha has more than 200 farmers who came for the express purpose of attending this school, and they have been buying tractors at a lively rate since they arrived.

Omaha, the principal city of the state, has a population of 200,000. It is the second live stock market of the world. It is the second primary corn market of the world. It is the first feeder sheep market, the first range horse market and the second sheep market of the world.

Omaha as a Market

Omaha's motor car trade in 1916 amounted to \$30,007,134. Of this \$4,347,000 was accessory business. Its area of distribution covers all Nebraska and Wyoming, half of South Dakota, one-third of Iowa, one-fourth of Kansas and corners of Missouri and Colorado.

Omaha's jobbing trade of last year amounted to \$193,759,493, an increase of 20 per cent over 1915. Her bank clearings passed the billion-dollar mark, reaching \$1,279,158,591, an increase of 25 per cent over the previous year. Her packing house industry amounted to \$149,768,860. Seventy per cent of all livestock received in this great market is packed here. The smelter output for the year was \$46,019,279. New buildings erected during the year amounted to \$7,226,107.

Savings Show Thrift

The thrift of Omaha and of the state at large may well be shown by savings deposits in Omaha banks. There are at present 78,559 savings accounts amounting to more than \$500 each in Omaha banks, and the total savings account figure is \$39,843,600. In other words, one out of every three persons in this city has more than \$500 in the bank. Is it to be wondered that one out of every twelve people in Nebraska owns a motor car?

Of dealers and distributors in this territory, there are about 5000. In 1915 there were approximately 1500. The distribution of these dealers is approximately:

Nebraska, 3000; western Iowa, 1600; South Dakota, 400.

All the larger dealers in this territory are down to low ebb in motor cars on hand to fill orders, and the smaller dealers are little better off. Following the frantic efforts of distributors and dealers alike to get some action on the part of the railroads to load and rush cars west, the embargo orders on certain roads against other classes of freight and the "home route orders" were hailed joyfully in the hope that these might serve to alleviate the situation. This has been realized, it is said, only in a small measure.

STROMBERG EARNINGS

Chicago, March 2—Net earnings of the Stromberg Motor Devices Co. of Illinois for 1916, all of which stock is owned by the Stromberg Carburetor Co. of America, were \$278,000, or \$5.50 a share on the stock.

MAY REVIVE REMINGTON

New York, March 5—There is a strong probability of a revival of the Remington company, which was organized a few years ago for the manufacture of motor cars, under the name of Remington Motors, Inc., with temporary offices at 100 Broadway, in the office of W. Morton Hetzel, a financial organization. The new Remington is expected to list at approximately \$1,050 and will use a Wisconsin engine. Negotiations are at present on for securing a factory for assembly purposes. A complete organization has not been effected, but a few officers have been selected. David Rheinhold will be engineer. Factory work will be in charge of E. H. Chappell.

FORD SHOWS HIGH ECONOMY

Chicago, March 3—A gasoline mileage of 29.8 miles per gallon was recorded in an official A.A.A. test on a Ford touring car in Chicago yesterday. The test was performed to demonstrate a new carburetor of somewhat unique principle developed by the Automobile Mfg. Co., of this city. Tests for economy and acceleration were made first with the stock Ford carburetor at the point where it gave best economy and good pulling power and the test then repeated with all conditions the same except that the new carburetor was substituted. Weather conditions were very bad for economy showing as there was a strong cold wind blowing and temperature way below freezing. With the stock carburetor, a mileage of 15.4 miles per gallon was registered. There was one traffic stop. An acceleration from 5 to 25 miles per hour in 14.6 sec. obtained. With the new carburetor, a mileage of 29.8 miles per gallon was registered and an acceleration from 5 to 25 miles per hour in 13 sec. There were six traffic stops during the latter economy test, the car carried three people. The test was sanctioned by the American Automobile Association and was conducted by E. A. Hillman, technical representative of the contest board of that association.

Miners Crowd This Show

Wilkes-Barre Exhibition Demonstrates Wealth and Resources of Coal Region

Attendance for Week Was Between 30,000 and 40,000

WILKES-BARRE, Pa., March 5—The show held in this city last week did more to demonstrate the wealth of the surrounding region than could anything else. The characteristic attendance at shows in most other cities of the size was absent—there were comparatively few farmers here. Instead of farmers made wealthy through manipulating the market, there were hundreds of coal operators and men connected with these operations, for be it remembered the Wyoming valley, picturesque and rich in its resources, produces between 40 and 50 per cent of all the anthracite, or hard coal, mined in the United States.

The show was held in the Armory and Hampton Hall. It was an improvement over last year in that there was more space. Even at that the space was limited because of the demand. There were thirty-one dealers exhibiting seventy-seven cars. The show next year probably will be held under one roof instead of two. Between 30,000 and 40,000 attended.

Wilkes-Barre is the center of the anthracite fields and owes its wealth and prosperity to its location in the heart of one of the richest anthracite fields in the world. The value of coal produced is greater each year than all the gold produced in the country at the same time. During 1916 Luzerne county produced 35,266,086 tons of anthracite. This is almost half of the production in the entire state.

CAUSAN LEAVES CHALMERS

Detroit, March 5—Nemorin Causan, the French motor car engineer, who has been employed in the drafting room of the Chalmers company recently, has resigned his position and will leave America. Mr. Causan suffered a severe illness from gas while serving in the European war and will return to France for medical treatment. He is the designer of many famous racing cars and was formerly editor of the Technique Automobile.

TO INCREASE MISSOURI FEES

Kansas City, Mo., March 5—The Missouri legislature has passed a bill providing for double the license fees that have been collected heretofore. Each motor car owner will have to pay around \$10 a year instead of \$5, the fees being graduated according to horsepower from \$5 to \$12. License fees for trucks are rated by weight unloaded, from \$5 for 2,000 lbs., to \$30 for a truck weighing 10,000 lbs. unloaded.

The clubs and dealer associations have

been furthering the bill providing for these increases. They have assurances that the money will be spent on the state's roads. Other measures in the general assembly provide for appropriations up to \$200,000 for assisting counties in building roads, for a tax of 10 cents on the \$100 for road purposes and provisions by which the state can take advantage of the federal road extension plan.

For several weeks it looked as though the state would enact legislation that would eliminate municipal licenses for motor cars, or would provide for doubling the municipal licenses. When the state started to double license fees, the cities saw a chance to get more money, too, and many officials went to Jefferson City to protect their interests. The state law as passed by both houses provides, however, that no city can charge more than half the amount of state license fees for its local licenses.

U. S. RUBBER EARNINGS

New York, March 6—Special telegram—Net sales of the U. S. Rubber Co. for 1916 were \$126,759,129, compared with \$92,861,016 in 1915. The balance available for dividend on common stock is \$5,442,113, or 15.12 per cent on the outstanding \$36,000,000, compared with 9.51 per cent in 1915. The sale of \$16,000,000 first and refunding mortgage, 5 per cent bonds, announcement of which was made several weeks ago, provided funds for the company to pay its entire debts and the debts of its subsidiary companies with the exception of \$9,000,000 General Rubber Co., debentures due December, 1918, and \$2,600,000 Canadian company due October, 1916.

STUDEBAKER EARNINGS FOR 1916

South Bend, Ind., March 5—The annual report of the Studebaker Corp. shows the net sales for the year ending Dec. 31, 1916, to be \$61,988,594.09, from which was derived a profit of \$8,611,245.08, or 13.89 per cent. After deducting 7 per cent dividends on preferred stock 26.14 remained for the common stock, of which 10 per cent was distributed in dividends and the balance was added to the surplus. The surplus now equals 37.40 per cent of the outstanding common stock. The book value of the common stock Dec. 31 was \$91.38 a share.

PLANS ACCESSORIES SHOW

Chicago, Mar. 6—An accessories show covering a city block is planned by Rothchild & Co., one of Chicago's largest department stores. This exhibit will occupy the seventh floor of the store for the week, beginning March 17, and special arrangements have been made to show most of the accessories in actual use. One hundred and twenty-five demonstrations will be in progress constantly. The booths will be in charge of manufacturers' representatives and experts, the object being to make it an educational sales exhibit. Naturally, special prices will be quoted on accessories that week.

To Spend Millions

FOR SOUTHERN ROADS

Sixteen States of Division Can Get \$3,500,000 for Highways Through Federal Aid Alone

WASHINGTON, D. C., March 3—The Southern states are to build many roads this year. As it is, the total annual public revenues spent for road and bridge construction in the sixteen Southern states increased from slightly more than \$21,500,000 in 1904 to about \$52,500,000 in 1914, according to statistics just published by the U. S. Department of Agriculture, and Jan. 1, 1915, they had outstanding more than \$77,000,000 in road and bridge bonds, state and local.

The road mileage at the close of 1914 was 814,567. There were about 73,600 miles of surfaced roads. The greatest road development that year was in Kentucky. There 21.4 per cent of the total road mileage was surfaced.

1917 to Set Record

This year all past figures will be surpassed, and naturally, in view of the federal aid now available. The Southern states will receive \$1,704,928 from this source, which they will have to match, of course, making \$3,500,000 as a starter. In addition, money has been voted by counties, cities and raised by subscription to aid special projects. Here, briefly, is what the states are doing:

Alabama—State expenditures estimated at \$1,162,000 and county work at \$2,000,000.

Arkansas—State 3-mill tax estimated at \$1,500,000. This does not affect the \$8,650,000 project, about one-half of which has been completed.

Florida—State revenue estimated at \$1,500,000 and local work at \$2,600,000. Florida has been working at road projects several years, and the roads recently constructed are estimated to have cost \$17,000,000, most of them being tourist highways or projects in connection with land reclamation.

Georgia Makes Estimate

Georgia—Estimates of this year's work are equal to the expenditures of last year, about \$5,000,000.

Kentucky—Work is planned to cost about \$3,000,000, which is \$500,000 more than last year.

Louisiana—The legislature has under consideration a project that will require about \$25,000,000 and will carry out a statewide road project. New Orleans has

Bonds Are Voted

voted \$500,000 to perfect terminals to the several national highways that end in the city.

Maryland—This year \$5,350,000 will be available. It will go toward carrying on work that in recent years has cost \$18,000,000.

Mississippi—More than \$3,000,000 is assured for road work. Much of this is from counties completing cross state highways. One county has voted \$900,000 in bonds.

Missouri—The state good roads bill has been passed by the legislature, and for the first time a state unit plan will be at work. Including the \$3,000,000 voted by St. Louis county but now tied up by litigation, there will be more than \$6,000,000 for work planned.

North Carolina—Work costing \$6,000,000 under way. This follows expenditures estimated at \$5,100,000 last year.

Million in Oklahoma

Oklahoma—The state department has \$500,000 for new work and \$250,000 for maintenance. Bonds and local subscriptions are being arranged over the state, the lowest estimates being \$1,000,000.

South Carolina—The road sentiment is just getting under way. Some bonds have been voted, but figures are hard to obtain.

Texas—The work for 1917 is estimated at \$40,000,000 on a basis that plans are twice as large as last year, when \$20,000,000 was expended. Of the 258 counties, 203 are pushing road work.

Virginia—Engineers estimate this year's building at \$2,240,000 and maintenance at \$700,000. Last year's building is estimated at \$1,600,000. Reports are of sixty-seven bridges to be built this year.

West Virginia—Various districts in the state are voting on \$2,525,000 of bonds at the spring elections. Last year authorized bonds totaled \$7,678,500. Since 1912 work costing \$13,280,000 has been completed. Road work is expensive and slow because of the mountains.

BIG MOTORIST GATHERING

Memphis, Tenn., March 2. The good roads committee of the Business Men's

Club Chamber of Commerce is planning to entertain several thousand motorists from Alabama, Tennessee, Mississippi and Arkansas during March and April at several meetings to be held here for the purpose of discussing projected highways. When the various routes which have already been organized are completed, Memphis will be the hub of a great highway system. On April 5 and 6, the Jefferson Davis Highway Association will meet and motor drives will be held from Paducah, Ky., and Jackson, Miss., the extremities of the route.

During the Harahan bridge celebration, to mark the opening of the \$2,000,000 railroad bridge, which will have driveways by which Arkansas and Tennessee will be linked, the Southern National highway and the Muscle Shoals highway organizations will meet and drives will be held for both of these events. The Southern National highway is to run from Washington to San Diego, Cal., through Memphis, Little Rock and Dallas.

The committee will issue on April 1 a route book showing the best routes to every Southern city from Memphis. There will be 10,000 copies issued.

The route for the Memphis-Springfield, Mo., branch of the Ozark Trails will be selected at a meeting to be held at Jonesboro, Ark., from May 1 to 3.

MIDLAND TRAIL BOOSTERS MEET

Ashland, W. Va., March 2—About 400 good roads enthusiasts of West Virginia and Kentucky attended the bi-state meeting of the Midland Trail Association at Ashland, W. Va. Brief addresses were made by Dr. R. R. Elmore, Louisville, Ky.; Gov. W. A. McOrle of West Virginia; Eugene Stuart of the Louisville Automobile Club; Rodman Wiley of Frankfort, Ky., and others. Governor Stanley of Kentucky was unable to be present. A banquet was held for the visitors at the Elks' Club.

USED CAR CASE DEBATED

Louisville, Ky., March 1—If a movement initiated night before last is carried through, Louisville dealers will cease making large allowances for used cars when new ones are purchased. Fifty-two men, proprietors, members of retail firms and salesmen met at the Seelbach and dis-

cussed the problem of the used car, the consensus at the close of the discussion being that local dealers have been entirely too liberal.

The meeting was called by W. A. Thomas, the motor car man being invited to hear F. W. Gottlieb, of the Chicago Automobile Trade Association. Mr. Gottlieb discussed the evils arising from taking old cars in partial payment for new ones and advocated the use of regular market reports, such as are published by the Chicago Automobile Trade Association. This association gives market reports for different zones in the country, basing its reports on the average allowance made for cars in the different sections. The system explained by Mr. Gottlieb seemed to find favor with the Louisville dealers.

"Allowances made for used cars actually have amounted to more than the dealer's profit in certain instances in Louisville," Mr. Thomas said. "And it is not an infrequent occurrence for a dealer who makes, say, \$300 on the sale of a new motor car to allow \$300 on the sale of a new car, in consequence of which his entire profit is tied up in the old car. And then he sometimes has to sell the old car for \$250, thereby cutting his profit \$50. This is not only a loss to the dealer, but in many instances a clear violation of the ethics of the trade, where motor cars are supposed to be sold for certain fixed prices."

The prevailing sentiment among the dealers taking part in the meeting was favorable to the formation of a new dealers' organization, which will be entirely distinct from the Louisville Automobile Dealers' Association. Another meeting will be called soon at which the same phase of the motor car business will be discussed more thoroughly, Mr. Thomas said, and the motor car salesmen of the city will be invited.

CHEVROLET SURPLUS GROWTH

New York, March 2—The Chevrolet Motor Co. during 1916 showed an increase in its surplus of \$29,469,588, largely through the acquisition of stock of other companies. This increase is equal to 46.04 per cent on the \$64,004,800 stock. Among the investments were 450,000 shares of common stock of the General Motors Corp. The net income from operations was \$7,095,071, and current additions to surplus from the stock secured in the other companies, \$22,374,517. The profit and loss surplus at the close of the year was \$31,123,274. Approximately 77,000 cars were sold during 1916. This compares with 11,888 in the 4½-month period in 1915.

The balance sheet shows an increase in real estate, plant and equipment from \$13,811,590, in 1915, to \$17,058,269, while cash decreased from \$4,192,968 to \$3,281,784.

The capital stock of the company was increased during 1916 to \$64,004,800 against \$19,752,300 in the preceding year.

'16 Exports Lead '15

Sale of 80,050 Motor Vehicles Abroad Was Despite Unexpected Obstacles

Increase in Value Amounted to \$1,711,468

NEW YORK, March 3—Last year the American motor car industry maintained its record of expanding despite unexpected obstacles. During the year Great Britain and Italy prohibited the importation of motor cars, and France raised the duty on them to 70 per cent. Freight congestion at Russian ports made it almost impossible to ship cars and trucks to that country except for government use. At the same time ocean freight rates were abnormally high and cargo space to Europe and the Far East very difficult to get. But despite these obstacles the United States exported last year 80,850 motor vehicles, the value of which aggregated \$96,595,861. This was an increase of 16,892 vehicles over 1915 and an increase in value of exports for the year of \$1,711,468.

There was a decrease in exports of trucks from 22,094, valued at \$59,839,308, in 1915, to 18,903, valued at \$52,870,774, in 1916. But the shipments of passenger cars to foreign countries increased from 41,864, worth \$35,045,090, in 1915, to 61,947 cars, worth \$43,725,087, last year.

In addition to complete vehicles parts were exported to the value of \$24,001,000; tires, \$15,211,943; and motor car engines, \$2,480,650, making a grand total of \$138,289,514 as compared with \$125,306,568 the previous year.

France was the largest buyer, paying \$23,279,846, mostly for trucks. England's purchases, amounting to \$17,083,616 and also mostly for trucks, were only half as large as in 1915. Sales to all other European countries decreased from \$22,490,725 in 1915 to \$14,519,483 last year. European Russia was the third most liberal customer in Europe, taking \$8,546,563, representing government purchases almost exclusively.

Canada took \$8,965,200 worth of cars, very nearly double her 1915 purchases and almost equal to the purchases of all the rest of the Western Hemisphere combined.

The Antipodes was a fine market, also. Australia spent \$5,727,233 for our cars; the British East Indies, \$3,359,379; and other Asia and Oceania, \$10,842,305. The other side of the globe is a better market than the new world exclusive of the United States and ranks second only to Europe. This is due chiefly to the fact that it is peopled largely by persons of European nativity or descent, principally speaking the English language.

OHIO ROADS SITUATION

Columbus Ohio, March 2—Whether the good roads movement in Ohio is to pro-

gress at the rate it has maintained the last few years is dependent largely on adoption of measures in the legislature, proposed by Senator White, Sandusky, and Representatives Mulchay of Henry and Guthery, Marion, according to W. A. Alsdorf, secretary of the Ohio Good Roads Federation.

"These bills embody the recommendations of the federation and will bring about corrections in the Case road law to which this organization has given much attention for several months," Mr. Alsdorf said. "The general purpose of the law is in the right direction but because of the many amendments offered the day it was enacted the measure was rendered indefinite, inoperative and confusing in many of its provisions."

Representative Guthery's tax measure, which would provide a degree of relief to all taxing units and yet hold intact the principle of the Smith law, has been endorsed by the federation.

WOULD BOND OWNERS

York, Pa., March 2—A bill has been prepared by Representative Duncan Sinclair of Fayette county for introduction in the House of Representatives, which will require every owner of a motor car or truck to file a \$2,000 bond when he applies to the state highway department for a license, operators and chauffeurs being required to do the same thing. The bond would be given in the name of the state and require approval by the court of the county where the owner, operator or chauffeur resides.

Under the terms of the bill the bond would be used for the benefit of any person obtaining judgment for injury caused by the motor car and the highway commissioner, when notified of a finding, would certify the bond to the notary of the county so that collection could be made upon proper order of court. The bond would remain in force until its whole amount was exhausted and could remain good in part in case a verdict did not amount to the face of it.

IMPROVES N. O. T.

Columbia, Mo., March 3—Work to remove the Mineola Hills, the big obstacles on the Old Trails route from St. Louis to Kansas City, of which Columbia is a half-way point, has begun. The deeds to a new route have been obtained in the Montgomery County court; a survey has been made; telephone poles have been moved and reset. The leveling of the route will begin with the going of frost.

For five years Montgomery County has been trying to get rid of these hills. The route is beautiful and picturesque, being an important scenic part of the trails between the two Missouri cities. The road is to be hard-surfaced for 8 miles. As limestone is abundant in that region, the cost is estimated at a lower cost than usual. The state will be asked for a rock crusher and convict labor.

tactor. Pressure on the starting lever moves the shift rod first to the position shown in B, closing the motor circuit at P and P₁ through the resistance R; this starts the motor at low speed. Further motion of the shift rod to position C opens the electric circuit, but the motor and pinion continue to turn, owing to their momentum. When the position C is reached, the pinion still is turning slowly so that it cannot fail to mesh with the gear; but as power is turned off the motor, there is no difficulty in sliding the teeth into full engagement. As soon as the teeth do engage, further foot pressure on the starting lever shifts the rod to the position shown in D, closing the electric circuit at Q after the pinion and gear have meshed a sufficient distance to present a good bearing length on the teeth. This connects the motor directly to the storage battery so that full power is impressed, turns over the engine until the starting lever is released or the engine picks up on its own power. There is an over-running clutch between the flywheel pinion and the motor, so that if the pedal is not promptly released when the engine picks up, the motor is not driven by the engine. When the pressure is removed from the starting lever, the shifting-rod springs return all parts to position A. This releases the gears and opens the electric circuit, and the motor comes to rest.

The pinion is meshed with the gear on the flywheel in the Bijur system as applied to the Hupp motor car by pressing the starting pedal, and by a further movement the starting switch is closed. Four stages in the operation of starting the engine are shown in Fig. 202. No overrunning clutch of any kind is used in this particular system, and for this reason the motor should be disconnected from the flywheel just as soon as possible after the engine starts to fire.

Automatic Electromagnetic Pinion Shift

The starting motors the Westinghouse Electric & Mfg. Co. used in this application are composed of three principal parts; the stationary parts, or field; the rotating parts, or armature and shaft; and the shifting magnet. The armature is mounted on a hollow shaft; on the end of this shaft is mounted a splined pinion which drives the engine flywheel. The pinion is made to slide along the shaft by a shifting rod which is attached to the pinion and passes through the hollow shaft. The other end of this shifting rod acts as the core of the shifting magnet. When the motor is not revolving, a return spring holds the pinion at the end of the shaft and clear of the flywheel gear.

As shown diagrammatically in Fig. 203, when the starting switch is closed a circuit is complete from the negative terminal of the battery through the switch, the shifting magnet, the arma-

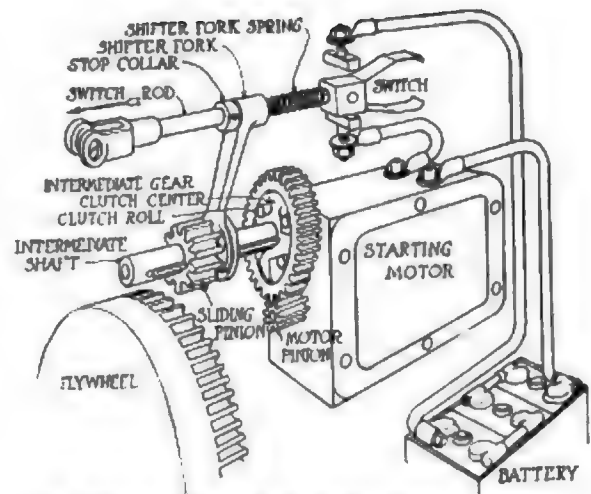


Fig. 200—Drawing to illustrate fundamental principle of the non-automatic pinion shift

ture and the series field of the motor to the frame of the car and through this to the positive terminal of the battery. The motors used in this application are of the series type; that is, the field is connected in series with the armature so that all the current flowing through the one also flows through the other. One of the characteristics of this kind of motor is that the amount of current flowing through it is proportional to the amount of energy it develops.

When the starting switch is closed, current flows through the circuit as noted above, causing the armature and shaft and the pinion to rotate. The motor requires a high current at the instant it starts from rest. This high current, through the shifting magnet, energizes it sufficiently to overcome the force of the return spring and therefore draws the shifting rod through the shaft, thus sliding the pinion into mesh with the gears on the flywheel. The teeth on the flywheel and the pinion are cut diagonally so that they mesh very easily. As soon as the pinion meshes with the flywheel gear, the current required to turn the engine over is enough to hold the pinion in mesh until the engine fires. When the engine picks up it soon runs at higher speed than that of the motor.

When the engine speeds up so that its speed approaches the no-load speed of the motor, the current in the latter falls off so that the pull of the shifting magnet is less than that of the return

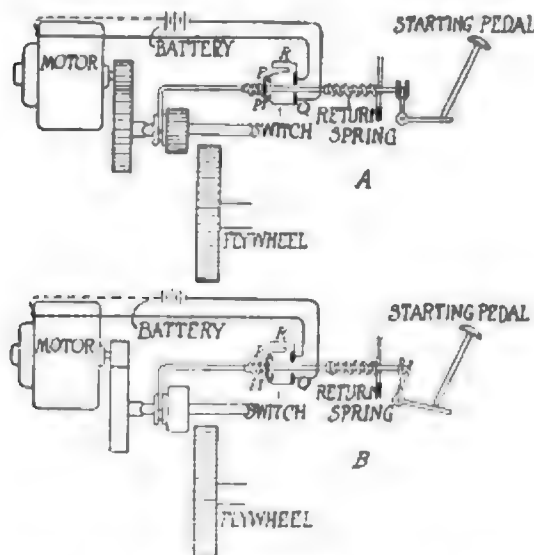


Fig. 201—Westinghouse system—A gives the "off" position of the shift pinion and switch contactor; in B the motor circuit is closed and the motor starts at low speed

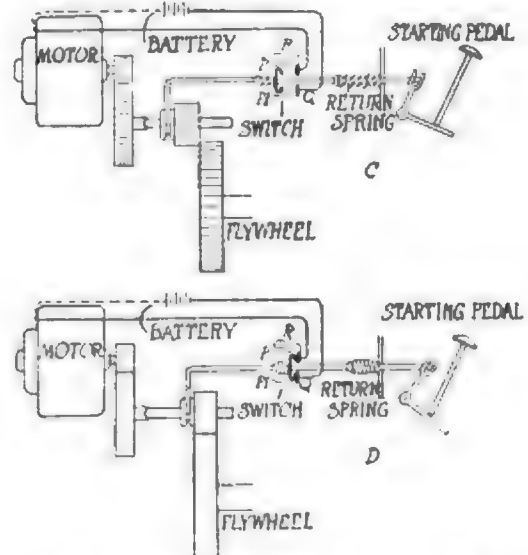


Fig. 201—At C the teeth can be slid into full engagement, after which the motor connects directly with the storage battery and the engine is turned over, D

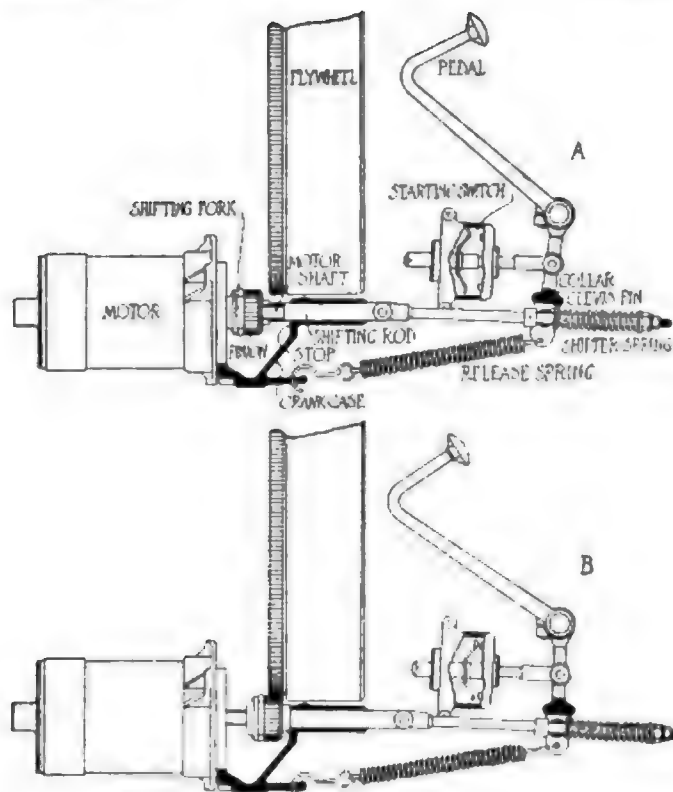


Fig. 202—Bijur system—as applied to the 1916 Hupmobile—A, out of action, starting switch off, pinion against motor head; B, about to crank, gears have meshed, but switch has not made contact

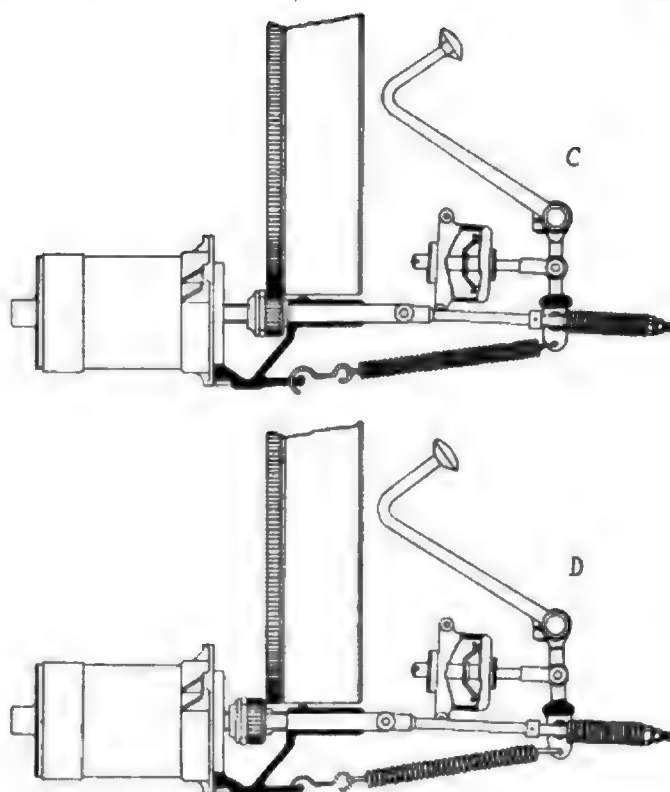
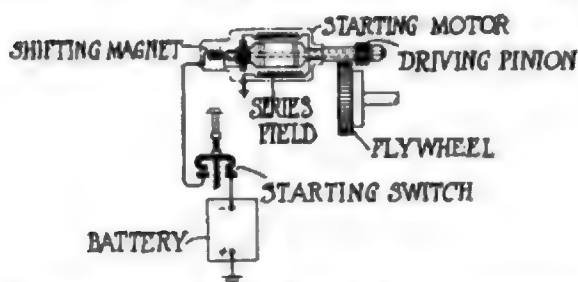


Fig. 202—C, cranking, note cap between collar on shifting rod and clevis pin—shifting fork is against stop, and shifter spring is compressed slightly. D, about to crank, when gears are not meshed, teeth are butting but switch has made contact. Shifter spring is compressed strongly, ready to draw pinion into mesh



spring, which therefore throws the pinion to its original position clear of the flywheel. The motor will continue to revolve, without load, however, until the starting switch is opened or released; but the pinion remains out of mesh, because the current required to turn over the motor is not enough to energize the shifting magnet sufficiently to pull the pinion back into mesh against the force of the return spring.

Fig. 203—At left—Here the closing of the starting switch completes a circuit between the terminals of the switch

Akron, Ohio, March 3—The Miller Rubber Co. will offer its common stockholders 5000 shares of new common stock pro rata at par. The Miller is the third rubber company to increase its capital within the last week. Goodyear Tire & Rubber Co., Firestone Tire & Rubber Co., and Miller Rubber Co. are now all refinancing and offer a total of \$14,870,000 par of new stock.

St. Louis, Mo., March 5—The Dorris Motor Car Co. announces an increase of capital from \$30,000 to \$1,000,000 and the election of W. R. Colcord as president to succeed H. B. Krenning, founder of the company. Mr. Krenning will retain an interest in the company but plans to retire. He was elected president when the company was organized in 1905.

Mr. Colcord is a native St. Louisan and has been president of the Colcord-Wright Machinery & Supply Co., which office he will resign to devote his attention to the Dorris company. Other officers of the company are: George P. Dorris, vice-president;

Capital Increases

Webster Colburn, treasurer; A. C. Schmid, secretary. I. C. Huckermann, president of the Polar Wave Ice & Fuel Co., and Frank C. Thompson, president of the Carondelet Foundry Co., have been added to the board of directors.

Akron, Ohio, March 3—The Firestone Tire & Rubber Co. is issuing \$5,000,000 worth of 6 per cent preferred stock, making a total capitalization of \$10,000,000 with 6 per cent preferred with a par value of \$100 and 300,000 shares of common stock with no par value. The new issue has been underwritten by the Cleveland Trust Co. and will be offered soon to the public.

SUES NEW DEPARTURE

Hartford, Conn., March 6—Special telegram—A suit for \$2,000,000 damages and an injunction against the New Departure Mfg. Co. has been brought in the superior court here by Albert R. Rockwell, who

was deposed from the presidency of the corporation Oct. 19, 1915. Mr. Rockwell asks for an accounting regarding his inventions and discoveries used by the corporation and wants the corporation restrained from using any of his inventions, discoveries and processes in its future manufacturing activities.

NEW OHIO ELECTRIC MODEL

New York, March 6—The Ohio Electric Car Co. has brought out and is showing at the Boston show a new model 44 built on the same chassis as the model 63, but with a different type of body and single control. This model sells for \$3,280.

DIES IN ACCIDENT

Indianapolis, Ind., March 5—H. D. Hutcheson, Chicago, district sales manager for the Lexington-Howard Automobile Co., Connersville, Ind., with headquarters in this city, was killed last Wednesday when a motor car in which he was riding turned turtle on the Jackson highway 6 miles west of Lafayette, Ind.



ates a set gear. This is placed in one position for forward travel and in another for reverse.

2—By reversing the armature current in the motor by a four-point switch.

3—This is not proven. The world's fastest car and incidentally, the largest racing car, the monster Fiat, is a four.

PRINCIPLE OF OWEN MAGNETIC Elementary Explanation of Use of Magnetic Attraction for Variable Speed

Gaineville, Tex.—Editor MOTOR AGE—Explain the Owen-Magnetic drive.—A Reader.

The principle of operation of the Owen Magnetic drive is developed in Fig. 4, 5 and 6 as follows:

Fig. 4—A—Magnet with keeper familiar to everyone.

B—Magnet on pedestal with hand crank to revolve it.

C—Piece of steel on pedestal placed within magnet on same line of travel. It will be apparent that as the magnet is revolved by turning the crank it will attract the piece of steel which will revolve with it.

Fig. 5—B is now revolved by gasoline engine instead of hand crank, taking the place of the flywheel and revolves at engine speed regulated by the throttle, and to accurately describe it, we will call B a revolving field. C is now part of propeller shaft, and to accurately describe this we will now call C an armature, and when car is running in high speed, C follows B, because it is magnetically locked, but it will be noted that we are driving through an air space or gap, there being no mechanical connection at any time between the rear axle and the gas engine, only magnetism transmitting the torque of the gas engine to the rear axle. When arriving at a grade which is too steep to climb on high, we would not stall our gas engine unless we applied a form of speed reduction.

Fig. 6—The conventional electric motor D, as shown in illustration 6, gives us the reductions needed in the following manner: We now drive through what is in effect a slipping clutch in the old type gear transmission car, all the power of the engine would be transmitted to the rear wheels and there would be no use for a gearbox. The magnetic transmission gives us this result, as we now find that C is trying to keep up with B, but as B and C now have ceased to be magnetically locked, because we have changed the position of the control lever on the steering wheel, and are therefore slipping, the difference in their relative speeds generates electricity which is led to D. Armature E, being of the same form as C and on the same propeller shaft, takes the electricity generated by the slip and acts as a power booster on the propeller shaft, giving us innumerable speed reductions, wonderful

Inquiries Received and Communications Answered

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A. J. Montagne... Beaumont, Tex.
A. C. Zimmerman... Pekin, Ill.
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Harvey Jensen... Viborg, S. D.
A. Subscriber... Covington, Ind.
Ray Montgomery... Synarep, Wash.
B. E. W... Wichita Falls, Tex.

flexibility and absolute silence at all speeds.

HISPANO-SUIZA ENGINE SPANISH Cuban Corrects Statements in Aviation Motor Story

Havana, Cuba—Editor MOTOR AGE—In the article on aviation engines in the issue of Feb. 15, it is stated that the Hispano-Suiza engine is of French design and that the Hispano-Suiza firm has been building motor cars in Paris for a dozen years. I know with full certainty that the Hispano-Suiza is a Spanish firm whose main works has been established in Barcelona since 1905. Its branch factory in Paris was opened in 1911 and not twelve years ago.

The original aviation motor was first designed, developed and built at the Barcelona factory more than two years ago. Then the French Government tried it with severe tests and ordered to the French Hispano-Suiza Works to try the production. This was so successful that the allies ordered urgently more than 6000 motors. The Hispano-Suiza factories at Paris and Barcelona are building 2000 of them but, it being impossible to fill the demand within stated time, many other firms take the construction of the H-S motor with his rights. These firms are: Peugeot, Aries, Brasier, Doriot-Flandrin, Voisin and Lebaive in France. The four firms are well known motor car manufacturers. Also are building the H-S motor at the Royal Aircraft factory in England, the S. C. A. T. at Italy, the Russian War Office at Russia

and the Wright Martin Aircraft Corp. in U. S., this being the largest concessionary—1000 engines.—E. Sanchez Marti.

PROBABLY NOT CLUTCH TROUBLE Fault in Rader's Car Probably Due to Intermediate Unit Instead

Decatur, Ill.—Editor MOTOR AGE—How can I stop the clutch grabbing on my 1915 model Maxwell touring car? I recently had the clutch relined, since which time it has persisted in grabbing, notwithstanding I have used neatsfoot oil, flake graphite and ordinary lubricant. When the car was new it did the same thing but finally the conditions became adjusted and the clutch worked beautifully until worn too much for dependable service.

2—How can I know definitely when the timing is just right on this motor?

3—Why do motor car makers persist in stating that certain cars used in tests for speed are stock cars, when they know they have been constructed quite differently from the regular stock product?—John W. Sanner.

1—Since neatsfoot oil, flake graphite and ordinary lubricants have been used without remedying the clutch trouble, it indicates that it is not the fault of the clutch but probably the fault of some other unit between the clutch and rear axle.

The splined connection between the universal joint yoke and the drive shaft may be badly worn and have too much lost motion, or play. Likewise the universal joint yokes and case may be worn badly which would also give too much lost motion. Either condition would make the car act as if the clutch grabbed, because there would be so much play in these parts that with engagement of the clutch, the clutch and other parts would be in motion and turning at quite a speed before the worn parts become engaged and apply power to the drive shaft. As a result, the car would be started forward with a jerk. But the clutch at this time would not be engaged sufficiently to drive the car, and consequently it would slip, allowing the drive shaft, which would then be driven by the rear wheels, to over-run the worn parts. Further engagement of the clutch would again jerk the car, and again the clutch would probably slip. This would continue until the car was under motion and the clutch fully engaged.

Another possible source of trouble is in a badly worn transmission front bearing. This condition in a car would allow the clutch and its shaft to drop slightly out of alignment, which would result in the clutch lining coming in contact with the flywheel at its lowest point only when the clutch is first engaged. It is not difficult

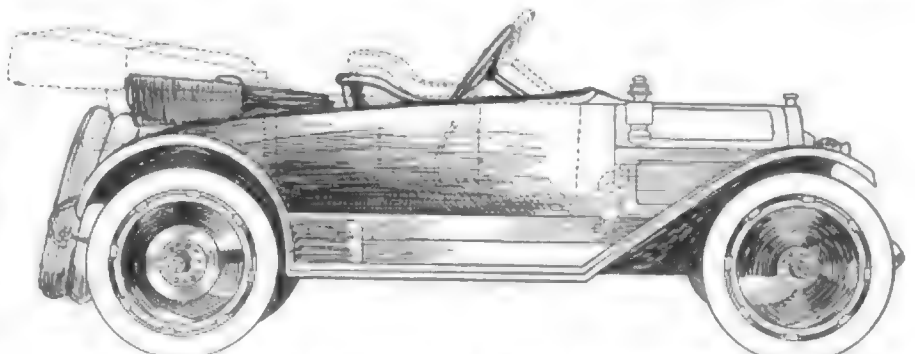


Fig. 2—Sketch of Hudson 33 converted into speedster with seats arranged cleverly for three passengers

to understand how this would give the clutch the symptoms of grabbing when first engaged, as the friction between the clutch lining and flywheel under above conditions would not be sufficient to start the car smoothly.

Still another possible source of trouble is in a worn crank shaft rear bearing. With such a bearing in the engine, the flywheel would drop out of alignment and allow the clutch lining to first come in contact with only the highest part of the flywheel. The result would be exactly the same as outlined in preceding paragraph. It is obvious that if the trouble is due to the above parts being worn, proper installation of new parts should remedy the trouble.

2—To tell definitely when the ignition on the 1915 Maxwell engine is timed properly, proceed as follows:

Remove No. 1 spark plug and place No. 1 piston (the front piston) in firing position (top of its stroke). With piston in this position, and spark control lever fully retarded, a slight movement of the piston on its downward stroke should separate the magneto breaker points.

3—Few of them do.

LOCATING KNOCKS BY THE SOUND Practically Impossible to Differentiate Between Carbon and Spark Knocks

Beaumont, Tex.—Editor Motor Age—Explain the difference in sound and causes of what is commonly known as carbon knock, spark knock, and gas knock. I understand that pre-ignition will cause a ringing knock. Would that apply to carbon and spark knocks?

3—I have an Abbott-Detroit Battleship roadster and have experienced considerable trouble with overheating. I believe that it is in the circulation. Although the water seems to circulate, I imagine the pump does not work as it should. What are the general causes of trouble of this kind, and the remedies?

3—Is there any adjustment that could be made on the timing gears to quiet them?

4—In an effort to make the motor run smoothly and develop more power I have made the following improvements: the cylinders ground and new aluminum pistons fitted, installed Atwater-Kent ignition, Rayfield Model G carburetor, A. C. Titan plugs, Stewart Vacuum feed, and still the motor does not idle smoothly and seems to fire stronger on two or three of the cylinders. Can Motor Age suggest something, besides grinding the valves, and the proper adjustment of the carburetor?

5—The motor is a Continental 44-50. The gear ratio is 2 1/2 to 1. The weight of the car with passengers is 4,300 lbs. Use 35 by 4 1/2 in. tires. What should be the maximum speed of this car under favorable conditions?—A. J. Montagne.

1—A man that can tell the source of engine knocks by the sound is like the man who can call off the names of all the opera singers when hearing their voices on a phonograph. It is a possibility, but it takes training. We hardly know what you mean by a gas knock. Carbon, or pre-ignition, knocks, have virtually the same effect on the engine as a spark knock, inasmuch as they cause the cylinder to fire before the piston is past top center. Therefore the sounds are very nearly alike. It might be said that a spark knock is generally more vigorous than a pre-ignition knock and therefore more metallic and louder in sound.

2—One great cause of engine overheating is in the troubles discussed in question

1. If the cylinders are so full of carbon that they cause pre-ignition or if the spark is set too early the effect will be to cause the engine to overheat. Another cause is excessively high compression, and another trouble may be in the cooling system.

3—Not in this car.

4—Having no means of viewing the operation of the engine we cannot say what the matter is. It may be that the fitting of the new pistons and rings and the grinding of the cylinders was not done properly with the result that the compressions in the cylinders are unequal, which causes a galloping of the engine.

5—It is impossible to give even an approximate estimate. To do so we would have to know the brake horsepower of the altered engine, wind resistance, tractive effort, etc.

WHY ATWATER KENT USES BATTER Causes for Broken Down Windings—Carburetion

Pekin, Ill.—Editor Motor Age—Why does not the Atwater Kent system, when used on Fords, use the Ford magneto except for starting, instead of using dry cells continuous?

2—Give any and all causes for broken-down coils, or windings in a high tension coil, or magneto winding and could an electric testing company overhaul it if it had a leaky condenser or a broken winding?

3—Does Maxwell still use dry cell ignition in connection for starting or do they use magnetos only?

4—What is the difference in admitting air between the carburetor and cylinder or by increasing the auxiliary air intake on the carburetor, and why does the former method give such quick acceleration?—A. C. Zimmerman.

1—Because the Atwater Kent system is designed as an improvement over the Ford magneto for ignition at all operating speeds. The claim is that it gives a more even and hotter spark when a hot spark is most needed.

3—The windings may be effected by a short circuit, by continual vibration of the car, by too close location to a hot motor, or by general deterioration from long service. A leaky condenser or broken winding can be repaired in a competent electrical shop.

3—Dry cells are used no longer in the Maxwell.

4—Theoretically the air and gas in the carburetor are compactly mixed into the proper explosive mixture. Any more air would mean too weak a mixture with consequent poor firing. When air is admitted above the carburetor it rushes into the cylinder without suspending itself thor-

oughly in the gas and gives oxygen to assist the combustion of the already mixed gas.

EFFECT OF USING OVERSIZE TIRES Better to Change Two at Once—Size and Pressure

New Orleans, La.—Editor Motor Age—If I attach a \$20 Klaxon horn to the engine of my car, will the heat of the engine hurt it in any way?

2—My car is now equipped with 34 by 4 tires. Will it hurt the car in any way if, as the tires wear out one by one, I should replace same with 35 by 4 1/2 tires?

3—How much less air pressure than that recommended by manufacturers can be put in the tires of a car using oversize tires?

4—Will the use of oversize tires affect a speedometer which is driven from the universal joint?—G. J. Rigau.

1—Not if there is a good air space around it.

2—It will throw more work on the differential and interfere a little with steering. Change the two rear wheels first, then the two fronts.

3—This depends on the car weight and the make of the tires. Tire calipers will show the proper inflation.

4—Yes.

CALCULATING THE ENGINE POWER What is Meant By N. A. C. C. Horsepower Rating

Voss, Tex.—Editor Motor Age—What is a horsepower according to the N. A. C. C. rating? I am informed that a horsepower is a power that will raise 33,000 lbs., one foot in one minute. Am I correct? Please explain how this test is made.—U. V. Cook.

Yes, the definition of a horsepower is correct.

The N. A. C. C. horsepower rating means the power rating of the engine as determined by the formula which has been adopted by the National Automobile Chamber of Commerce, which is the national association of manufacturers in the motor industry. The formula formerly was known as the A. L. A. M. formula from the fact that it was first adopted in America by the Association of Licensed Automobile Manufacturers. When this association disbanded, its standards were turned over by the Society of Automotive Engineers, and the horsepower rating formula, by the N. A. C. C.

The formula as usually stated is,
D³N

N. A. C. C. hp. = —, at a piston speed
2.5
of 1000 ft. per min., where

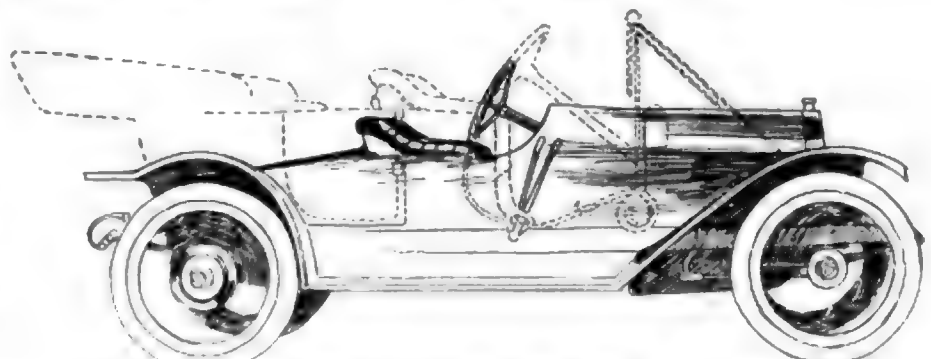


Fig. 2—Suggested body design for converting Hudson 20 touring car into speedster







Figure 1. A large, dark, textured object, possibly a piece of machinery or a large animal, viewed from a low angle.



Figure 2. A large, dark, textured object, possibly a piece of machinery or a large animal, viewed from a low angle.



the helicopter. The person was lying on a stretcher, and the helicopter was in flight. The person was wearing a dark jacket and light-colored pants. The helicopter was in flight, and the background was a bright, hazy sky.

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MOTOR AGE

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WILLIAM H. FLETCHER



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APRIL 1964

MEMBERSHIP CARD









dend rate of \$60 a share on its common stock.

The General Motors Co. of New Jersey has sold during the seven months ended Feb. 28, 1917, 95,533 cars and trucks, as compared with 73,057 cars and trucks for the same period a year ago.

The gross sales for these two periods are respectively \$102,930,670 and \$86,675,713, and undivided profits for common stock are \$16,000,984 for the last seven months as compared with \$14,991,979 for the seven months ended Feb. 29, 1916.

A quarterly dividend of 1½ per cent on the preferred stock has been declared by the General Motors Corp. of Delaware. The dividend is payable May 1 to stock of record April 12. The preferred dividend of the New Jersey company is 3½ per cent, payable May 1 to stock of record April 12. The amount of preferred stock now outstanding is \$19,980,300, and common stock \$82,539,000. In other words, practically all of the authorized amounts of these two issues are outstanding, having been issued in exchange for the stock of the General Motors Co. of New Jersey, the terms of which already have been announced.

During the first four months of the current fiscal year the company earned about 10½ per cent on the new common, or at the annual rate of over 30 per cent. As these four months constitute the light season in the trade, no barometer can be accepted as to what may be expected for the entire 12 months.

Predictions are made that General Motors will show net profits for the year to end July 31, 1917, of between \$35,000,000 and \$40,000,000, or about 40 per cent on the common.

MENOMINEE PRICES INCREASED

Menominee, Mich., March 12.—Increases in price on five models of Menominee trucks have been announced by the Menominee Motor Truck Co. The increases are as follows: Model EW, formerly \$1,295, now \$1,425; Model FW, formerly \$1,575, now \$1,700; Model H, formerly \$1,775, now \$2,050; Model D, formerly \$2,240, now \$2,475; Model G, formerly \$2,775, now \$3,275.

DORRIS CO. REORGANIZES

St. Louis, Mo., March 9.—The Dorris Motor Car Co., this city, has reorganized and the capital stock was increased from \$300,000 to \$1,000,000. W. R. Colcord succeeds H. B. Krenning as president. Mr. Krenning, together with G. P. Dorris and Webster Colburn, who have been associated with the company, will retain their interests. The new board of directors includes W. R. Colcord, Frank C. Thompson, L. C. Muckermann, George P. Dorris, and Webster Colburn. The officers of the company are W. R. Colcord, president; G. P. Dorris, vice-president; Webster Colburn, treasurer, and A. C. Schmid, secretary.

Used Cars to Have Show

Chicago Dealers Will Stage Exhibition in Coliseum
May 5-13

Auction May Be Part of Proposed Selling Display

CHICAGO, March 13.—A motor car show devoted exclusively to used cars is the latest of the unusual solutions of handling the second-hand car problem proposed by Chicago dealers. The Coliseum, which has been the scene of the annual motor shows, is to be filled May 5-13 with used cars by the Chicago Automobile Trade Association. Not a single new car will be among the several hundred exhibits, and cars will be sold direct from the floor. It is probable that some of them will be disposed of at auction. The used car show will be under the direction of a committee of dealers headed by Erwin Greer, Ford dealer. The project was announced last night at the annual election and banquet of the trade association.

More than 1100 members of the Chicago Automobile Trade Association turned out last night at the biggest gathering of any one local industry ever held in the city. The entire Bismarck Garden was turned over to the Chicago tradesmen. There were two toastmasters. Among the speakers were Judge Sabath, formerly of the Chicago Speeders' Court, and Michael Flaherty of the Board of Local Improvements, who spoke on the means for relieving congestion of traffic in the city. Henry Paulman of the Pierce-Arrow talked on the \$60,000,000 bond issue in Illinois, one of the main projects of the good roads enthusiasts of the state.

This banquet, so far as known, is the first ever to have been managed directly from the speaker's table by wire. The three orchestras and the twenty-four entertainment numbers were called into action at the far end of the big room by telephone.

New officers and directors were elected as follows: President, Joseph F. Davis, Winton; vice-president, C. R. Dashiell, Dodge; secretary, W. G. Tennant, Oakland; treasurer, Henry Paulman, Pierce-Arrow; directors, H. M. Allison of Packard, W. J. Boone of Moline-Knight, Howard F. Gardner of Willard, B. C. Buxton of Liberty and J. W. Maguire of Republic Rubber Co.

NEW MERGER IN INDUSTRY

Detroit, March 12.—The Detroit Motor Car Co. will be taken over by the Detroit Motors Co., a new \$4,000,000 corporation, this week in company with two motor car parts companies. The names of the parts companies are at this time being withheld from the public, owing to details yet to be completed. Plans have been made for the expansion of the Detroit

output, and it will be increased from 2000 to 5000 cars yearly.

J. S. Kuhn, New York banker, has been active in the financing of the new company and will be vice-president. A. O. Dunk, president of the Detroit Motor Car Co., will be chairman of the executive board of the new corporation. W. R. Bamford, vice-president of the old company, will be president; W. L. Heuser will be re-elected secretary. W. L. Van Deusen, sales manager, and R. T. Yeats, director of export sales, will continue with the new company in the same capacities. Election of officers and completion of details will take place in New York on March 15.

The Detroit company came under the direction of Mr. Dunk in July, 1915, and comprises a plant of 150,000 sq. ft., which will be increased to 600,000 sq. ft. The company expects to purchase land in Detroit and build a factory of 800,000 sq. ft.

SECURES \$60,000,000 BOND ISSUE

Hartford, Conn., March 9.—All the property and other assets of the Hartford Rubber Works Co., Hartford, Conn., a subsidiary of the United States Rubber Co., are listed in the big mortgage deed given by the rubber corporation to the Central Trust Co. of New Jersey as security for a \$60,000,000-bond issue recently authorized by the corporation. The bond issue will pay off the indebtedness of the corporation, with the exception of \$9,000,000 General Rubber Co. debentures and \$2,600,000 Canadian Co. bonds. It also will provide working capital. While the transaction affects the Hartford Rubber Works Co. only in a legal way, it practically means the local works are transferred to the Rubber Goods Mfg. Co., a New Jersey corporation and included, with many other subsidiaries of the United States Rubber Co., as security for the bonds. The entire stock of the Rubber Works, as recorded in the deed filed in the town clerk's office, is \$999,000.

4500 DEALERS AT BOSTON

Boston, Mass., March 9.—The annual show here ended to-night with all the dealers and salesmen full of enthusiasm for the spring and summer business. It was predicted by many of the dealers that when June arrives it will be impossible to get a 1917 car from any dealer. "All sold out" will be the statement. Next week several dealers will have their cars on view in their salesrooms, and there will be some small shows.

About 4500 dealers registered during the week. Hundreds of retail sales were made. The wholesale trade was a revelation. Dealers from out of town have been feeling the effects of prosperity, and they ordered freely to protect themselves. As there were some ninety cars shown it should not be an exaggeration to state that the sales of all of them ran up well into the 2000 class. Most sales were in the low-priced

class, though the men handling big cars also made many sales.

The truck sales were very big, too. There was much interest in the truck attachments this year, and many orders for them were taken. And the accessory men did a thriving business. The attendance was a revelation to visitors. On the last three nights the doors had to be closed at times with people clamoring to get in, holding money in their hands. Despite the storm early in the week there was a big crowd the latter part to make up for the slimness the first day so the figures will about equal last year.

The salon at the Copley Plaza was not very well patronized, and some of the out-of-town dealers were a bit disappointed. They figured that they bask in the limelight of the big show, but they somewhat were eclipsed. But everyone sold a car or two, about enough to pay expenses unless they came from some distance.

There was a meeting here this week of the used-car dealers, who are trying to formulate a plan to get the dealers to refuse to take cars in trade and so have them passed over to the used-car sellers. The matter will be put up to the dealers, but it is very likely that nothing will come of it. The dealers in new cars have built up such a big business in used machines that they would not sacrifice the trade to aid the used-car men.

PEERLESS PRICES HIGHER

Cleveland, Ohio, March 12—The Peerless Motor Car Co. has announced price increases on all but one of its models, to become effective April 9. The new sporting roadster will continue to sell at \$2,250, but the touring car and roadster will be \$110 higher, \$2,090 instead of \$1,980.

CAR PLANT FOR ATLANTA

Atlanta, Ga., March 8—G. W. Hanson will build a factory here for the manufacture of motor cars. His first model will be called Hanson's six. The plant will employ 100 or more men and will eventually turn out 2000 cars yearly. Associated with Mr. Hanson will be Donald Ferguson, an engineer, and Arthur Burdette of Atlanta. Every part of the car that can be built here will be made at the local plant.

UNITED MOTORS DEAL OFF

New York, March 9—Negotiations between the United Motors Corp. and the Brown-Lipe-Chapin Co. have been broken off. The United Motors Corp. will not exercise its option to acquire the factory and business of the Brown-Lipe-Chapin Co. This means that the two concerns will be connected in no way. While it was the impression in the motor trade that the Brown-Lipe-Chapin Co. had actually been acquired by the United Motors Corp., as a matter of fact, the negotiations had never progressed beyond the point of an option to purchase the Brown-Lipe-Chapin Co.

Western Dealers Visited

N. A. C. C. Manager Reports Coast Conditions Similar to Eastern

Used Cars and Freight Shortage Are Problems There Also

NEW YORK, March 8—Closer touch and better understanding between Pacific Coast dealers and the manufacturers is expected as a result of the visit to the coast of Alfred Reeves, general manager of the National Automobile Chamber of Commerce, Inc., the association of motor car manufacturers.

Mr. Reeves presented a comprehensive report to the N.A.C.C. on his visit, and while the report is not made public, apparently Mr. Reeves received many complaints from sub-dealers on the Pacific Coast who, according to their ideas, have not been well protected in certain matters. Perhaps the most important thing obtained by Mr. Reeves was that of getting the impression of the Western dealers and also giving them the thoughts of the Eastern dealers. It is known that the N.A.C.C. has during the last year done considerable work among dealers in getting service organizations in several cities and also with regard to the question of handling spare parts and co-operative insurance.

Mr. Reeves thinks the second-hand car situation one of the biggest subjects dealers have to handle at the present time. He believes the used car problem is little worse on the Pacific Coast than any other place. In eastern sections of the country dealers have used market reports for valuing used cars more than on the Pacific Coast, but the coast dealers are planning to put into use schemes for a more active valuation of used cars. It is possible that San Francisco will start in the near future some form of co-operative used car motor mart.

The Pacific Coast show, held in San Francisco, was, Mr. Reeves believes, the most representative get-together of dealers west of the Rockies ever held. Not only did all dealers in that section attend, but there were many from states east of the Rockies.

At present the Pacific Coast territory is suffering severely from a motor car shortage. This is largely due to a shortage of railroad cars. General industrial conditions are normally prosperous on the Pacific Coast but not abnormally prosperous as are conditions east of the Mississippi river. The fishing industry on the Pacific Coast is especially prosperous, and every day a special trainload of fish leaves the coast for Chicago and New York. Last year the orange crop of California was one of the best. The lemon crop in the same state was larger than previous crops. The nut industry is growing rapidly in that state.

The fuel situation is not so serious on the

Pacific Coast as in other sections, largely because there is much gasoline coming in from Mexico. Another situation which helps the gasoline problem is the general use of distillates by many trucks. Gasoline sells at 21 cents a gallon and distillate at 11. The Moreland was one of the leaders in the use of distillate.

A fuel problem gives promise of some difficulty on the northern part of the Pacific Coast in states where it is not permissible to sell gasoline of a gravity under 60. Such legislation naturally works to the injury of the fuel situation rather than benefiting it. It is well known that a gallon of crude will not yield nearly so much gasoline of 60 gravity as of 56 or 54 Baume'. The East has been using gravities under 60 for several years, and as a result the quantity of fuel from a given supply of crude is correspondingly greater.

MAY SCORE STANDARD OIL

Washington, D. C., March 13—Special telegram—The long deferred report of the Federal Trade Commission's investigation of increased gasoline prices will be made within the next two weeks, according to reliable information to-day. While Government officials are reticent about conclusions arrived at by the commission, it is said that the report will score the Standard Oil Co. on the ground that Standard's thirty constituent companies have not been wholly dissolved, despite the Supreme Court decree. This condition is said to be a big factor in increased prices because of the control of markets.

NEW HIGHWAY ASSOCIATION

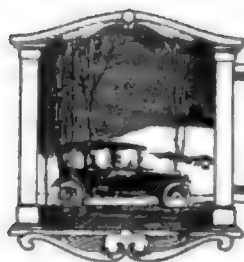
Springfield, Ill., March 10.—If multiplicity of good roads associations has any bearing on quality of state roads, Illinois should be a banner state. The latest of these is the Illinois State Automobile and Good Roads Association formed here this week. It is indicated that the organization may effect a merger with the Illinois Automobile Association, which has been in the state of silence for several years. Representatives of sixty-four motor truck and highway organizations were present.

For the present the chief purpose of the new association is to get behind the movement for good roads in Illinois and to support the Illinois Highway Improvement Association's platform, which calls for a \$60,000,000 bond issue, an increase in motor car license fees and appropriation to meet the federal aid law.

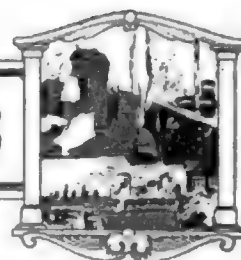
OVERLAND INCOME \$17,529,689

Toledo, Ohio, March 12—The net income of the Willys-Overland Co. in 1916 was \$17,529,689, according to the annual report issued by the company to-day. Of the net income, \$10,016,420 represents the net earnings and \$7,963,970 the premiums received on securities. Profits amounting to \$1,318,665 on shipments to distributing branches which were unsold Dec. 31, 1916,





EDITORIAL PERSPECTIVES



Where Shall We Park?

THE passage of two worthy ordinances this week by the Chicago city council designed to relieve traffic congestion and facilitate street car transportation in the downtown district, brings most acutely to Chicagoans and visiting tourists the question propounded on this page last week under the heading above. Traffic conditions in Chicago are such that there really is not room for carrying the current of vehicles in the downtown streets if this current is impeded and its course narrowed by vehicles standing along the curb.

ALSO, due to the traffic congestion, it has become dangerous for street car passengers alighting and boarding cars in the business territory. From broader standpoints, therefore, the two new ordinances are commendable. One of them prohibits the parking of vehicles in the loop district during rush hours and the other establishes loading zones at the principal street intersections for street car traffic, and vehicle parking is prohibited for a distance of 100 ft.

MOTORISTS cannot help but agree that these, or similar, restrictions to the parking of vehicles have become necessary; but it seems that the city fathers in this municipality, as in most of the others, stop before their work is completed. They ban the motor car from certain districts but provide no alternative places for the motor car to park. They close practically the chief space

for leaving vehicles within the downtown districts during business hours and force the business man who motors to work, the motorist shopper and the tourist either to leave their cars outside of the business district or, in this particular city, take advantage of the two municipal parking spaces which are handy only to a comparatively small proportion of those who must needs use it.

THERE are many other cities whose motorists are not so fortunate as to have had a public parking space provided, and in these cities the problem is the more severe one. Public spirited officials, both in Chicago and in some of the other large cities, are seriously considering the proposition of underground garages in which cars may be stored during business hours at a nominal fee. Such an arrangement can be a solution only in part, because the area which such a garage could accommodate handily would be too small to relieve the situation as a whole to any great extent.

IN other cities, the possibility of numerous small garages scattered throughout the business district presents itself. In most cities where this is possible from a geographical standpoint, property values are usually so high that daily storage rates would be almost prohibitive to the motorist of average, or less than average, income. There are many minds being put at work on this problem, and it is to be hoped that a solution will be forthcoming before long.

The Used Car Show

CHICAGO dealers are going to conduct a used-car show. Several hundred cars, every one of them used, are going to be racked up attractively in the big coliseum and sold off the floor—some of them under the hammer. It is the spring clearance sale for the winter holdovers and is a move in the right direction. The dry goods man, the furniture man, the haberdasher, the milliner, all clean out their shop-worn stock when the season is about to change. The same cleanout should be practical to the motor car dealer.

used-car show to wipe out a good share of this expense. And it does its business thoroughly.

ANOTHER thing it should do. It should awaken people to the bargains found in used cars. It should teach the people of a community the places where they can go to find used cars. Cars are taken in trade for what they are worth. The dealers have a more or less standard ratio of used-car value for different

makes and models. It is their purpose to dispose of these cars in a manner that will protect themselves rather than net them a profit, and the result is that there are real bargains. A reputable dealer will not sell a used car for more than it is worth, and this show will possibly convince the public of this fact. The advertising value of the show, in this regard, is certainly a noteworthy factor.

NEXT WEEK

How the wounded on the Italian-Austrian front are moved from the firing line to the dressing stations and base hospitals will be graphically told in Motor Age next week in W. F. Bradley's "Italy's Ambulance Service." Mr. Bradley served four months in the Italian ambulance service and writes from knowledge gained through actual participation in this grim work of moving the maimed from the field of war with shot and shell bursting over these workers in the ambulance service. The story will be illustrated by photographs taken by the author and passed by the Italian censor.

THIS show should do two valuable things for the dealer. It should save him money and clean off his floors to start the spring-selling drive with a clean slate. To the dealer whose available floor space is limited this business of clearing out used cars will be a valuable asset for spring sales. The sight of a motley assortment of old models intermingling with the new cars is not harmonious, and there is no question that an atmosphere of newness and concentration on new-car sales has a good psychological effect on the prospective purchaser.

WHEN one considers the time consumed by salesmen making frequent trips with prospects to the used-car room, the space taken up by these cars, the advertising expense and incidental overhead in disposing of them, no small sum of money is sunk before the used car finally leaves the floor. It is the business of the annual

HAVING saved the dealer money and cleaned off his floors for the spring-selling drive, the used-car show well may justify its holding. Dealers are realizing more the problem of properly disposing of used cars, and the show is as yet a new venture. If this exhibition proves as successful as there is reason to believe it will, the dealer will have come that much nearer the solution of one of his most important problems. The Coliseum calls for big business whenever used, and if this exhibition follows the precedents, it will fill all the ambitions its sponsors have created for it.

Elgin Road Race Date Set

Indianapolis Speedway Will Have No Races in Case of War

CHICAGO, March 12—Prospects for resumption of the annual Elgin road races this summer are brighter than they have been for two years. The classic was abandoned last year, and until recently it was thought it could not be resurrected. However, following a conference between the directors of the Elgin Road Racing Association and representatives of the Chicago Automobile Club, most of the obstacles have been overcome. Sanction has been granted by the American Automobile Association for Aug. 18 as the date for the event. Several of the speedway associations have given assurance that they will enter racing cars under their control.

SPEEDWAY PROMISES WAR AID

Indianapolis, Ind., March 12.—There will be no race at the Indianapolis Motor Speedway this year if the United States becomes involved in war with any foreign power. James A. Allison, secretary-treasurer of the speedway, declared last week in an address before a meeting of business men that it would be unpatriotic for the speedway to stage a race which would call for the waste of rubber, oil, gas, steel and the services of expert mechanics when the resources could be utilized to advantage by the Federal Government. Mr. Allison said the shops and mechanics at the Speedway, which are used for the development of racing cars, would be given over to the use of the government in case of war.

RACERS JOIN CHEVROLET

Los Angeles, Cal., March 8—Eddie Pullen, Mercer racing driver, is to become identified with the Oakland, Cal., factory of the Chevrolet company. He is here now and says he has not decided whether he will quit the racing game entirely or not. T. J. "Frenchie" Beaudet, one of the best desert and road race drivers in the country, has joined the Chevrolet.

ROAD BOOSTERS AT SPRINGFIELD

Springfield, Ill., March 13—Special telegram—Several hundred Illinois good roads enthusiasts are meeting here to-day to lend support to the campaign for pulling Illinois out of the mud through the affirmative action of the legislature in voting a \$60,000,000 bond issue for permanent highways. State officials and leaders in the Illinois legislature are in attendance. Fostered by the Illinois Highway Improvement Association, championed by Governor Frank O. Lowden, the bonding of the state

for the sum of \$60,000,000 seems likely to be undertaken and carried to a successful conclusion, which means that the next decade will see a network of 4000 miles of permanent roads.

A few years ago it would have been difficult to get an attentive ear to a proposition for roads which included the raising and expending of such a sum of money. To-day all is changed. The public wants the roads, and the question now to be settled is that of the manner in which the bonds shall be retired. Three issues are being considered. In some quarters it is felt

that motor vehicles should be taxed sufficiently to retire the bonds. Elsewhere there are champions of the direct tax on real estate. Speakers have shown here this afternoon that a levy of 2½ cents an acre would bring sufficient funds, while any reasonable increase in vehicle taxes might not be sufficient. It is felt that since all the people are to benefit all should contribute. To-day's meeting is in the nature of a lobby for the bill authorizing the bond issue, and the method of retiring bonds will be discussed further at public hearings on the bill March 21.

The Rival



I have a rival to my husband's affections.

Before this state of affairs came to pass we had plenty of money to spend—although we were not wealthy. But we enjoyed life. My husband dressed me nicely, we went around together and were very, very happy.

Now it seems that we are always skimped for money, I have nothing new to wear and for whole afternoons he deserts me while he places his time at the disposal of this rival of mine. He is quite flagrant about it.

He no longer buys wines when we go out to some restaurant or cafe, yet he persists in buying measureless quantities of expensive liquids for my hated rival.

I ask for a new frock. He frowns, looks serious and I know he is thinking. "Twenty dollars for a frock—why that will almost buy—" And I do not get the frock. In a day or two, however, my rival sports some new "necessity" as he would call it.

And I cannot look in a milliner's window without tears of despair in my eyes. The shoe shops fill me with unquenched longing. Silk stockings grace my slender limbs no longer.

He no longer brings me flowers even upon anniversaries.

He even forgot my birthday completely, although in the forenoon I chanced to hear him ordering something over the phone for my rival which cost more than many modest presents.

I am no longer first in my husband's affections—
Since he bought an Automobile.



RESEARCH: THE RESEARCH CASE IN THE 21ST CENTURY

The research case is a key component of the research process. It is a document that provides a clear and concise summary of the research project, including the research question, the research design, the data collection methods, and the analysis and interpretation of the results. The research case is a critical tool for communicating the research findings to a wide range of stakeholders, including researchers, policymakers, and the public. It is a document that is essential for the advancement of knowledge and the development of new technologies and policies.

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All Fort Dodge Holds Show

Moving Pictures of Cars and Exhibition Proper Display Trade Possibilities in That Territory

FORT DODGE, Iowa, March 10—One moving-picture house in Fort Dodge is showing the Death Valley Dodge this week. Another has a picture of the Hudson on its transcontinental run, while Ford and Willys-Overland factory reels are being featured at other moving-picture houses. But the motor car show business really is most evident at White's terminal warehouse, for there are on display ninety cars, thirteen trucks and three tractors, as well as accessories.

The dealers' association here is holding its sixth show, and it is the best one they have had. It occupies about 30,000 sq. ft. of floor space. The trucks and tractors are in the basement, while cars are on the first floor and cars and accessories on the second floor.

Visitors Want Touring Cars

Forty-one of the cars are touring cars, and sixteen are chassis. The visitors buy the touring cars and want to see the chassis. The decorations are styled Chinese on the first floor and floral on the second. They give color to the warehouse and make it an effective background for the exhibition. No fences mark the exhibits, as this show is more or less of a family affair, and the dealers wanted an open show. Each exhibit has its uniformed attendant, who keeps the cars dusted, picks up papers and is useful generally.

Nearly every salesroom contains an exhibit also, as some of the special models could not be placed in the exhibit. Studebaker is not at the show but has the gold chassis at its salesroom.

Tremain & Rankin, Dodge and Oakland dealers, are giving their dealers special courses on the electrical systems of their cars. There are about thirty-four dealers here.

More than 200 Overland dealers and salesmen attended a banquet given by the Overland Fort Dodge Co. Thursday night. Tremain & Rankin gave a banquet to their dealers Tuesday night. The Knight Motors Co., state agent for the Stearns-Knight, gave a banquet to its dealers Friday night. Nearly every dealer, in fact, had a banquet during the week.

Most of the store windows were decorated for the week. The Boston store had an Overland Country Club model on display, using it as a basis for a clothing advertisement.

Though the dealers in the territory know that there already is one car to every eight persons in their field, they are not discouraged. This is said to be the heart of the prosperous agricultural district of the

Green Bay Exhibits

United States, and even though 8,000 cars have been contracted for, which when sold will bring the rate down to one in seven, the farmers can do better even than that with the present prices on farm produce.

Whether this is the heart of the agricultural district of the country or not, it is the motor car center of northern Iowa. Last year Fort Dodge dealers sold and distributed 17 per cent of the entire number of cars sold in the state of Iowa. They sold 7384 cars. The year before 3971 cars were sold in this territory, so last year's sales show an increase of more than 80 per cent above those of the previous year.

This means that this territory spent \$6,645,000 for new cars last year, assuming the average price to be \$900 a car. If this season shows a gain of 50 per cent, about 11,000 cars will be sold in the territory, a total business of \$9,900,000.

The trading territory reached from Fort Dodge includes twenty-six counties with a total population of 437,464. In 1916 53,764 cars were registered in this territory, that is, one person in every eight now has a motor car. For the rest of the state the average is one in twelve.

But prosperity originates in this part of the country. The total income of the Iowa farmers in 1916 was three-quarters of a billion dollars. The Fort Dodge has a fair share of this income, too. Prosperity lies in the gypsum and clay deposits around Fort Dodge. The slogan of the city well is "We plaster the earth," for five mills turn out annually 460,000 tons of gypsum, valued at \$1,500,000, while 225,000 tons of clay are produced each year, their value being \$1,800,000.

Most of the twenty Fort Dodge dealers are sub-agents and cover from one to the whole ninety-nine counties of the state. The usual territory for a Fort Dodge dealer contains fifteen counties, however.

11,000 AT GREEN BAY SHOW

Green Bay, Wis., March 10—Between 11,000 and 12,000 people residing in North-eastern Wisconsin attended the first annual show given by the Brown County Automobile Dealers' Association March 3-5. It was the second show to be held in Northern Wisconsin during the fall and of winter under the patronage of the Milwaukee Automobile Dealers, Inc., which fostered a similar sectional exposition at Wausau, Wis., during the week preceding the Green Bay show.

The object of the sectional shows is to create business for dealers working under Milwaukee distributors, whose clientele was not in a position to attend the big Wisconsin show at Milwaukee, Wis., in January. As a retail selling proposition, the Green Bay, Wis., and Wausau, Wis., shows excel in results any show ever held in Wisconsin. Here cars actually are sold and the cash turned over to the dealer.

Fifty-four cars, representing thirty-seven different makes, were exhibited at Green Bay. Fifteen retail firms made exhibits, which were supplemented by eleven accessory and supply displays. The decorative scheme was installed at no expense to the Brown county dealers by the M. A. D., which also furnished a setting for the Wausau show. This consisted of a smaller edition of the decorative plan used at the last Milwaukee show.

LOUISVILLE SHOW NAME CHANGED

Louisville, Ky., March 9—The eleventh motor exhibition to be held in this city will not be styled the Louisville Automobile Show but will be designated in 1918 as the Southern Automobile Show. This change has been decided on by local dealers at the suggestion of men from the North and East who have been attending motor car exhibitions for years and who have placed Louisville's annual show at the head of the list of Southern displays. They declare it ranks first outside the national shows and those staged in motor car manufacturing cities.

FIRST BUSES FOR CHICAGO

Chicago, March 10—By the granting of a twenty-year franchise to the Chicago Motor Bus Co. Chicago is assured of its first motor bus service. The company is authorized to operate on all the boulevards under the jurisdiction of the south park board which granted the franchise.

The park commission is to receive 4 per cent of the gross receipts for the first five years, with a guarantee of \$10,000 annually; 4½ per cent with an \$11,000 annual guarantee for the second five years; 5 per cent with a \$12,000 annual guarantee for the third five years. Two routes will lead from Randolph street and Michigan avenue, one to Marquette park and the other to the Jackson park bathing beach. A third route will connect Marquette park with Jackson park, and a fourth will begin at Garfield boulevard and South Park avenue and end at the Jackson park bathing beach.

Our Orient—New Mexico

Country Around Santa Fe Once Habitation
of Pre-Historic Man—April 5 Issue for Details

SO OFTEN the critical tourist, who has been surfeited with the wonders of the old world and knows little of the new, is wont to say: "The United States lacks the atmosphere that age alone can give." If you ever hear anyone say that, remind him of the fact that down in our Great Southwest—New Mexico to be specific—there is a section with the coloring of the Orient, with a setting older than that of Babylon or Damascus, and having something of that intangible air of mystery that the Moors brought from the Far East. Out there, amid the scenic surroundings that must have reminded the builders of their Iberian home, blossomed the city of Holy Faith, the capital of the Sunshine state and the most picturesque city of our country—Santa Fe, a town that often is referred to as "hoary with age."

Pueblo Culture Had Basis

This ancient civilization, however, was built on another one equally picturesque, but a thousand years older. Before this old, old Pueblo culture is a substratum that imagination has pushed back to the very birth of mankind, the cliff and cave dwellers, whose 20,000 cave and cliff dwellings sit at the very door of the city of Santa Fe and puzzle the archaeologist with their well-preserved ruins and remains.

The tourist who knows how to travel will approach Santa Fe with reverent attitude and with proper preparation. To enjoy the quaint, historic city, with its many scenic, ethnologic, historical and pre-historic attractions, one should read something of the city and its surroundings. The city does not thrust itself on the traveler with glittering minarets or lofty spires. One should read Bandelier's "Delightmakers," for example, to catch something of the romance and mystery of the cliff dwellers. Those of you who have read "Ben Hur" should remember that Lew Wallace had not seen Palestine when he wrote his famous book, but drew his pictures of the Orient from the familiar surroundings of Santa Fe.

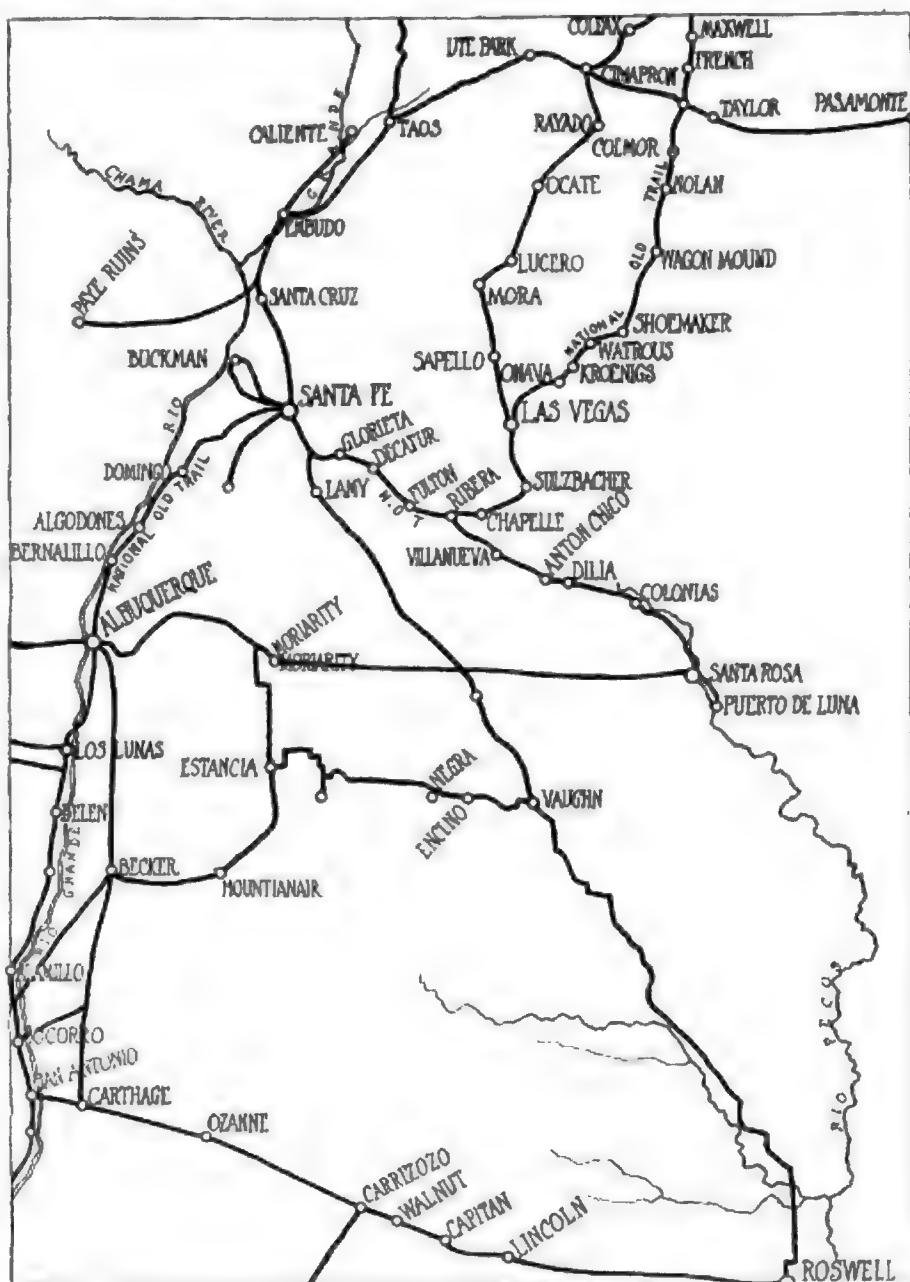
New Mexican scenery is compelling. There is diversity that should offer attraction of the most fastidious. Days might be spent exploring the old cliff dwellings. The first view one gets of the sunset as one ascends the Glorieta divide in the Sangre de Cristo range will reveal the reason for the impressive name which translates into "Blood of Christ" mountains. The state is not a network of roads, but it must be remembered that towns are far between and there are great

areas of sage brush country where one main road is enough. The National Old Trails is the main thoroughfare through the northern and central parts of the state and the Southern highway and Borderland trail traverse the southern end of the state.

TOUR AROUND LAKE PLANNED

Chicago, March 12.—Plans are under way for a tour to encircle Lake Michigan

along somewhat the same route as the Chicago Motor Club's reliability run in October of 1912. The proposed run will include three states, will start from Chicago to Michigan City, where it will pick up the West Michigan pike, to Frankfort. Here a steamer will take the tourists directly north to the other side of the lake, to Manistique, the return route being south along the west side of the lake to Chicago.



The map shows the roads leading through this far corner of our country, the Pueblo region

Managing Project Change Risks

Implementing a Change Management Process

By Robert M. Kegan, PMP, and Robert M. Kegan, PMP

Change management is a critical component of project management. It involves the process of managing the people side of change, ensuring that the organization is prepared for and able to successfully implement change.



1. Identify the Need for Change

2. Analyze the Impact of Change



3. Develop a Change Management Plan

4. Implement the Change Management Plan



him a freshman?—receives ten lessons or lectures in the assembly lecture room. These lessons are both thorough and elementary. The lectures are based on the principle that the new student is a total novice regarding anything mechanical, and he is given every small root of the construction and repair of power-propelled vehicles in the lecture room before tackling the tree of practical work which follows. These lectures are not all illustrated with charts and drawings. There are cut-away carbureters, magnetos, gearsets and even complete engines and complete chassis.

The student then passes into the blacksmith department and, in practical work, learns all he will ever need in this business. In fact, before he is turned out of the blacksmith department he must forge from the rough a complete set of chisels which must match master patterns and stand a rigid examination as to their accuracy and hardness.

He is then taught vulcanizing in all of its phases and with all different types of apparatus. Oxy-acetylene welding is taught him. It is not a mere matter of teaching either. He must do satisfactory welding without aid before he is led to the next department.

Probably the majority of garages in towns of 5000 people or under are not machine-shop equipped. Nevertheless this is a present condition and the garageman of the future, in whatsoever small a community, will find a machine shop handled by an experienced man a money maker. Sweeney is teaching practical machine-shop practice. He has a battery of lathes, six of them, drill presses, shapers, millers and even a gear-cutting machine. Students can have all the time they want in this department, as they can in every other. When I visited the school last week there was pointed out to me a student operating the big lathe of the shop. He had been at work for three weeks on that one machine, and he was a post-graduate, too—at Sweeney's willing expense.

There is a special and separate department to teach valve grinding. The student really grinds

valves until he knows how. Piston ring fitting, babbitting, soldering, brazing and valve timing are practically taught. When a student enters the valve or ignition timing departments he finds a gang of engines in each, representing all types, and these engines are as completely out of time as the class which just graduated from the department could leave them. It is up to the incoming class to learn how to time and to do the work of timing these engines so that they will run under their own power.

Motor Assembly and Testing

Motor assembling and testing, carbureter and magneto construction, maintenance and repair, magnet recharging, etc., are all thoroughly covered. Starters and all electrical equipment, including the battery, have modern and complete departments in the school. The student is not only taught how to recharge and repair batteries but he also learns the delicate operation of tearing them down and rebuilding them with new separators, jars, etc.

This battery department is one of the most thorough of the school. Here batteries are brought which are in every condition of wreckage and decomposition. Cells dry of electrolyte, plates buckled, separators split, jars cracked and broken. It makes no difference how badly off the battery may be, it is the students' job to put it into first-class condition and charge it to the proper test. There is a steaming oven for loosening the cell covering to permit easy removal; there is a complete

and modern recharging plant with which every student must become familiar.

Back in the electrical department is a new house lighting outfit, one of the Deleo products. Electrical house lighting in the rural districts by the compact equipments consisting of a gasoline motor driving a generator is becoming a common thing in the Southwest, and here the farm student can learn the care and repair of these.

I saw a lecture room in which were probably fifty students in a class. The lecturer stood on a platform before the class and behind a long counter on which were to be found every used type of magneto and kindred electrical devices. He lectured, not from diagrams on a blackboard, but with an electrical instrument or a part of an instrument in his hand. This gives the student a chance for direct thinking and therefore greater concentration on what the lecturer is saying. Were the device to be pictured on the blackboard he would be obliged to picture mentally what the real device looked like and at the same time listen to the lecture as applied to the picture. This would scatter his thoughts and he would learn less. That is the theory in teaching the student everything possible directly from the device itself, whether it be a distributor or a complete car.

Lastly he carries all the knowledge he has already gained into the repair shop, and here he has indeed the opportunity to prove his mettle and what he has really learned. He finds a score and more of cars of all types and ages and in every condi-

tion of assembly and disassembly—mostly disassembly. The students that graduate from this department vie with each other to see who can dismantle a car most completely and twist its "in 'ards" about in the most puzzling way. The incomers step into this maze of wreckage with the duty of putting these cars back together again so that they will operate—properly—under their own power. When I walked through the department I counted four students scratching their heads, and I didn't blame them—even if their hands were greasy. It is some job, and the students that make those cars



A total of \$750,000 will be expended before this ten-story motor car school is ready for occupancy



Children and adults
standing in a line



A Step Toward Uniformity

Kansas City Patterns Its Traffic Regulations Essentially to Conform with the Eno System

KANSAS CITY has a set of traffic regulations which are being well enforced by the police and are very materially alleviating congestion downtown. These rules are not all that might be wished, but they are a conspicuous start in the right direction. And that Kansas City has this much is due, largely, to the campaign of *MOTOR AGE* for standardizing traffic rules. Indeed, J. A. Harzfeld, city counselor, and Edwin Camack, chairman of the legislative committee of the Automobile Club, talked standardization ideas as much as local safety—and both kept the pages from the issue of Sept. 23 on their desks while the ordinance was being prepared.

A. J. Watson, president of the Federation to Protect Life and Property, also uses this issue to indicate what Kansas City must do to keep up with the procession, to avoid being in a class by itself without proper traffic regulations.

The campaign of *MOTOR AGE* came at a time when the promoters of traffic rules

were badly discouraged. For several months the Federation and members of the National Safety Council had been trying to make headway, using as a text, the pamphlet of Mr. Eno's street traffic regulations, issued by the National Safety Council. A frequent answer to the appeals for the adoption of such regulations was that they looked too complex and too difficult of enforcement. But *MOTOR AGE* showing that other cities had adopted features of the Eno plan and that many of the ideas were essential as well as feasible, helped to a change of sentiment. So positive was this change that despite the fears of the city counselor, there was comparatively little opposition to the adoption of the ordinance. This opposition was important, though small; it was overcome at the last moment by the united action of the Automobile Club, Federation to Protect Life and Property and the local Safety Council, together with other organizations.

While Kansas City aimed at the Eno

system, it fell short in several important particulars. For example, it eliminated parking on east and west streets downtown but allowed ranking on north and south streets at intervals of 4 ft., excepting near hydrants, large building entrances and transfer corners. These provisions have eliminated much of the congestion, however. Another feature that has not been worked out satisfactorily has to do with safety zones. The ordinance allows motor cars to pass safety zones. But there is some doubt as to whether these are really zones at night, for moveable standards are used to mark the limits of the zones, in addition to painted lines. The standards are removed from the streets at night and as there are no crossing patrolmen on the streets at night there, it is now a question whether the motorists must stop at night behind street cars, standing to receive or discharge passengers, in the downtown districts, as they do day and night in the outlying districts.

"The service of *MOTOR AGE* in the standardization of traffic rules has certainly been helpful to me and Kansas City," said J. A. Harzfeld, city counselor. "I have studied its suggestions very carefully and have used as many as possible at this time."

Edwin Camack, chairman of the legislative committee of the Automobile Club, is equally appreciative, mentioning, also, the fact that *MOTOR AGE*'s campaign assisted materially in stimulating the members of the club to the necessity of their working to secure proper traffic rules. Mr. Camack is continuing the service to the community in obtaining interpretations of the rules as well as in the encouraging of their enforcement.

ST. LOUIS TRAFFIC RESTRICTED

St. Louis, Mo., March 12—Two additional traffic regulations have become effective in the congested district recently through action of the board of alderman, who followed the advice of the police traffic squad.

One prohibits the turning of a car on any street in the congested district. Drivers who wish to reverse directions must go around a block. The second gives police power to signs set on curbs "do not park cars between these signs." Heretofore these signs depended on the courtesy of drivers. Such signs placed by occupants of property will not stand. In case too many of them are posted, the police have power to remove or alter the free spaces so designated. A third new regulation extends the 1 hour parking limit to additional streets.

Direction Signal Criticised

Reader Takes Exception to Device That Is Useful Only to Motorist

LOUISVILLE, Ky., Editor *MOTOR AGE*—I have been reading with a great deal of interest the recent comment in *MOTOR AGE* on the subject of direction signals for motor cars and especially the articles signed Edwin H. Roberts, and as there is nothing like discussion to enable anyone to get at the actual facts, I am taking the liberty of criticizing certain of the statements made by that gentleman.

Mr. Roberts admits that the traffic signal is a coming necessity and that the installation of signals on closed cars at least is only a matter of time and yet he makes the very broad statement that no front signal is required "as a slight movement of the hand suffices." Strange to say, he follows this statement with the assertion that frequently when intending to make a turn, drivers hold out the right or left hand, as the case may be, and then turn the other way; the statement that a signal of this kind is given for the information and guidance of a driver following in the rear will certainly not go with the man on the street, who knows that for his direct benefit such a signal is almost universally given.

Then again, can anyone imagine a slight movement of the hand on the part of a person in a closed car, conveying any

information to the driver of a car following in the rear?

Of course, with a system of signals controlled by several push buttons or lever positions, a mistake is possible, especially if such a system is being operated by a driver who is in the habit of throwing out his left hand when he intends to turn to the right. In this connection the writer would suggest that no cross-eyed person be permitted to act as chauffeur.

If Mr. Roberts is right in his assertion that traffic signals are for the protection of one motorist against another and then only when traveling in the same direction, there is nothing further to be said, but to the man on the street, who frequently holds his life in his hands when he attempts a crossing, such a statement necessarily suggests a "road hog" who fails to recognize the fact that his poorer brethren, whose circumstances compel them to walk, have rights that even motorists are supposed to respect.

We agree that a traffic signal has to come, but while Mr. Roberts wants it for the protection of the motorist under one special condition, the writer wants it for the protection of a long suffering public, under traffic conditions generally. Max C. J.

Rewinding Electrical Machines

Instructions for Altering Starting Motor or Charging Generator to Be Used as a Motor on Different Voltage from Rated Value

By David Penn Moreton

GENERAL instructions for rewinding a direct-current motor or generator so that the machine will operate satisfactorily as a motor on a circuit whose voltage is different from that for which the machine was originally designed involve certain fundamental facts and relations, and after these facts and relations are thoroughly understood the necessary changes are quite easily made. For convenience, let us assume that we have a series-wound starting motor which is rated at 6 volts and we wish to change the armature and field windings so that the machine will operate as a shunt motor on a 32-volt system.

The very first thing that we must do is to determine the value of the voltage generated in the armature when it is revolved at a certain constant speed for different values of current in the field winding.

The connections for making this test are shown diagrammatically in Fig. 1. A voltmeter *V* of suitable range should be connected to the brushes of the machine. A variable resistance *R* and ammeter *A* should be connected in series with the field winding and the combination in turn connected to a battery *B*.

Before starting the test make sure the brushes are in their proper position which may be determined by moving them backward and forward around the commutator until the position which gives a maximum voltage for a certain speed and field current is found. Now keep the speed of the armature constant, say at 4000 r.p.m. and gradually increase the field current by decreasing the resistance *R* in series with the field winding and battery.

Allow the field current to become steady at certain values, say 25, 50, 75, etc., amperes and for each of these values of field current determine the value of the voltage as indicated by the voltmeter. Let us assume that the value of the voltage generated for different field currents corresponds to the values given in the following table when the speed is 4000 r.p.m.

CURRENT AMPERES	PRESSURE VOLTS
0.....	30
25.....	1.04
50.....	2.02
75.....	3.08
100.....	4.16
125.....	4.87
150.....	5.25
200.....	5.64
250.....	5.86
300.....	5.98
350.....	6.04

This observed relation between current in the field winding and the value of the generated voltage may be represented

graphically as shown in Fig. 2. Current is laid off to a suitable scale on the horizontal line and voltage to a suitable scale on the vertical line. The line marked 4000 r.p.m. will be what is called the magnetization curve of the machine for a speed of 4000 r.p.m. The magnetization curve at any other speed may be readily determined from this one by increasing or decreasing the height of the curve in proportion to the increase or decrease in speed, since the voltage generated varies directly as the speed.

For example, the height of the 6000-r.p.m. magnetization curve will be one and one-half times the height of the 4000-r.p.m. curve; likewise, the height of the 2000-r.p.m. curve will be just one-half the height of the 4000-r.p.m. curve, etc.

It will be observed that the three curves shown in Fig. 2 have quite a pronounced curvature in them at a point corresponding to a current of approximately 125 amp. This point in the magnetization curve is called the "knee" of the curve. Now in the operation of the machine it is desirable to have the magnetic circuit magnetized to such an extent that the magnetic circuit is being worked above the knee of the magnetization curve.

Now assume this machine is to be changed to a shunt motor for 32 volts. In this case, the field winding will be in parallel with the armature and the voltage applied to the field winding will be 32 volts. It is apparent that if 32 volts be connected to the low-resistance field winding now on the machine that a very high value of current will be produced and the winding will more than likely be seriously damaged and at the same time an excessive current will be drawn from the source of energy. Both of these difficulties can be overcome by rewinding the field which may be done as follows:

Carefully remove the field windings from the poles and in doing so count the exact number of turns around each pole and at the same time observe the manner in which these coils are wound around the poles and connected together in order to produce the proper polarity. The product of the number of turns in each coil and the current in the coil in amperes at any time gives what is called the ampere turns.

If all of the field coils are connected in series, then they will carry the same current and it will be equal to that indicated

on the ammeter *A* in Fig. 1. In some cases the field coils may be connected in parallel and in such a case the current in each coil will be equal to the total current divided by the number of circuits or paths into which field coils are grouped. Let us assume in this particular case that there are eight turns in each coil and they are all in series, then for a current of 175 amp. there will be 7×175 or 1400 amp. turns per pole. This number of ampere turns is to be produced by a pressure of 32 volts applied to the new winding. That is, the resistance of the new field windings, all in series, should be such that the current produced by 32 volts multiplied by the number of turns in each coil will give a value of 1400 ampere turns. Now if there are four field coils in series the voltage applied to each coil will be equal to one-fourth of the total, or 8 volts. Assuming for the time being a field current of I_s amp. then the resistance *r* of each field coil will be equal to $(8 \div I_s)$ ohms, or

$$r = \frac{8}{I_s}$$

Also assume that there are *N* turns in each coil and that the average length of each turn is *L* feet. This length will have to be approximated by measuring around the pole core out a distance equal to what you think will be one-half the depth of the new coil or winding. Now the resistance of the coil may be expressed as follows:

$$r = \frac{K \times N \times L}{A}$$

In this last equation *A* is the area of the wire to be used in circular mils and *K* is a constant depending upon the kind of material. For copper the value of this constant *K* may be taken as 12 for ordinary operating conditions.

There are two values of the resistance *r* given above and they may be placed equal to each, which gives the following equation:

$$\frac{8}{I_s} = \frac{K \times N \times L}{A}$$

$$\text{or} \quad 8A = K \times N \times I_s \times L$$

$$\text{then} \quad A = \frac{K \times N \times I_s \times L}{8}$$

The product of *N* and I_s in this last equation represents the value of the required ampere turns, which is 1400 for this particular case. Let us assume that



Abstract



Abstract





Figure 1. (a) A person sitting and looking towards the camera. (b) A person sitting and looking towards the camera. (c) A person sitting and looking towards the camera. (d) A person sitting and looking towards the camera.

A MEXICO AT PEACE

Lower California Is Building a State Highway Instead of Quarreling

DYNAMITE—that's what I want. If they'd only let me have enough of it, I'd have this road completed by next May. I'm going to get it, though, one way or another. I've got the money to pay for it and that usually gets anything."

And with a slight shrug of his shoulders and an elevation of his eyebrows, Estabano Cantu, military governor of Lower California, indicated to his chiefs of staff, engineers and other officers assembled with him about the banquet board at Mexicali that he knew whereof he spoke. His subalterns were positive of it and the gringo visitors from Los Angeles, who heard him say it, mindful of dire things that have happened in the past and always fearful of borderland possibilities, were discreetly silent.

This was no declaration of war on the part of Governor Cantu, though. It must be noticed that he was speaking of finishing a road, and this is the story. With every other section of Mexico teeming in turmoil, Baja, Lower California, is in a state of peace with itself and the rest of the world. Why is this? The answer is Estabano Cantu, appointed military governor of Lower California by one of Mexico's numerous presidents.

Dynamite for Blasting

But about this dynamite. Cantu really does want it. The United States authorities refused to permit its importation. Cantu wanted it to blast out the sides of mountains to open the way for his road now in building from Mexicali to Tia Juana and intended eventually to reach Ensenada, the capital of his peninsular country.

Governor Cantu has been in Los Angeles and Southern California and has seen the development brought about by good roads. He has seen thrown open to public use paved highways on the northern side of the border that become sand stretches full of chuckholes after the line of sentries has been passed. On the California side of the Imperial Valley region he has seen what water systems have done for crops and how these crops have been taken over concrete roads. These developments have been an inspiration. He realizes they would mean the same thing in Lower California, so he is seeking to bring them about. Motor cars are not uncommon in Mexicali, directly across the line south from Calexico, the two towns whose names are formed through the combination of the words California and Mexico, the first syllable determining the location in relation to the boundary. The governor makes his

New Military Governor Wants Good Roads System

home in Mexicali and he desires to see that city as well provided for municipally as Calexico.

The United States would not send dynamite to Cantu, but he sent cotton to the United States. And cotton was greatly in demand. On every pound that crossed the border, Cantu levied a tax. This, in a measure, accounts for the fact that some time ago when he purchased an American-made motor car he paid for it in gold coin shaken from an old leather poke. He always seems plentifully supplied with money, one of the virtues of peace.

When *el gobernador* decreed he would have a modern road 24 ft. wide, built of macadam and concrete, extending 128 miles from Mexicali to Ensenada, linking all the border towns on his side of the line, his people knew he would have it. Had they not seen him build a \$40,000 school building when there were no children to put in it? They said *manana* it would be filled. He sent out his engineers and after Senor Aldunzin and his assistant Gonzalo Garito had reported on its feasibility, he asked not, "How much will it cost?" but merely told them to go ahead.

Though the highway rises from below sea level in the Imperial country to an altitude of 4200 ft., where it crosses the Black Butte mountains, Senor Aldunzin has drawn his plans and specifications so that there shall be no grade to exceed 10 per cent nor any curvature of less than 24 deg. The governor's engineers are, the same as he, graduates of Chapultepec, the Mexican training school that occupies the same relative position to the Mexican army as West Point to that of the United States. Though Aldunzin and his assistants are officers of the army, they have departed from military service, along with Jose Cantu, brother of the governor, to devote all their energies to road work and kindred enterprises.

It is proposed to make the new highway the main artery of travel in northern Lower California. The proposition embodies the later construction of several links. When completed, it not only will provide a commercial outlet but a strong military asset for moving troops and supplies. The thousands of acres of cotton land will become immensely valuable. Picking the staple furnished an income for thousands of laborers, most of whom are Chinese, and the crop was not all garnered until late in

February. The laborers in the fields and those on the road are paid in American money. There is no peonage under Cantu, and he seems to have an abundance of gold always at his command for any purpose.

Scenic attractions that will induce hundreds of motorists from the United States to travel over the new highway are many and varied. About 20 miles from Mexicali and only a few miles from the road is the famous Laguna Salada, Salt Lake, which is about 65 miles long and varying in width from 5 to 12 miles. It is similar to the Great Salt Lake in Utah inasmuch as it has no visible outlet, but the salt saturation is less. This region is a paradise for the hunter of wild fowl. Wild geese and ducks obscure the light of the moon frequently when making migratory flights, it is told, so dense do the flocks travel; and to fill the tonneau of a motor car with these birds is a matter of only a few hours' effort. Skilled marksmanship is not an essential to a full game bag.

There are hot springs near the lake, and some day Cantu may realize another source of income by opening a resort here. The shifting sand dunes with their element of weird mystery always are changing. The Black Butte mountains were the home of bands of marauders until Cantu got on the job. He has practically killed all of them, and he has offered no alternatives.

Camps Are of Huts

The road construction camps are made up of clusters of thatched huts and tents. There is an effort toward sanitation, and though from 300 to 600 men have been at work for many months, there has been no disease to contend against. The sites for the camps always are well selected. The thatch serves to keep out the blistering heat of the sun and is ample protection against rain. The disease-carrying proclivities of the rat are recognized, and a careful watch is kept against rodents. In the huts are some of the luxuries of civilization. The Mexican loves music and in addition to the usual hand instruments there are music boxes in assorted sizes and values.

Supplies and materials for the road work have been hauled on wagons, but Cantu is a thorough progressive. He has bought American made trucks. He is an ardent motorist. For his own use and that of his assistants he has three Packard twin-sixes, four Hudsons, two Vim trucks, a Haynes touring car and has ordered four additional Packards. There are small cars without number, and the hardest kinds of service is required of these.



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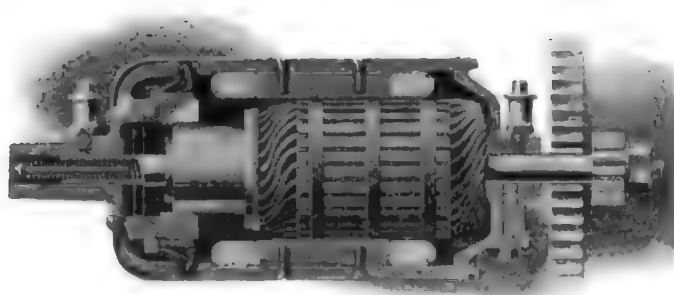


Fig. 205—Sectional view of old Bosch-Rushmore starter. It is still a feature of Bosch products but has been improved decidedly

or cocks the screw gear so that it clutches and binds on the screw shaft and turns with it. This automatic clutching is due to the centrifugal force of the unbalanced weight. When the electric motor stops running the screw gear has been fully screwed away from the flywheel gear, and it remains in that retarded position until it is required to start the engine.

The gear on the screw shaft has an automatic self-cleaning action, but, in any extreme case, should the gear tend to stick on the shaft, through being covered with mud, it may be necessary to clean the screw.

The teeth on the screw gear and flywheel are chamfered, or pointed, on only one side to make the meshing natural and easy. However, should the teeth meet, end to end, the screw shaft itself is designed to move backward automatically and compress the coil spring. This gives the screw gear time enough to turn and enter the flywheel gear. Should sticking of gears ever occur, they can be released by throwing in the clutch and moving the car. Such trouble would be due to incorrect chamfering or inaccurate alignment of the gears. Also it might be due to the binding of the drive parts and prevent compressing and proper functioning.

If, while the engine is running, the electric motor should be started accidentally, the screw gear will screw over against the turning flywheel gear. But instead of the clashing and smashing of gears that might be expected there is no danger whatever, as the gears simply touch once. This is because the flywheel gear will speed up the screw gear, and thus automatically screw it away. The turning screw gear will then automatically clutch and bind on the screw shaft, in exactly the same manner as when it is cranking and has been de-meshed when the engine starts exploding.

Old Bosch-Rushmore Electromagnetic Drive

The starter drive used on the old Rushmore system, which was acquired by the Bosch Magneto Co., and later known as the Bosch-Rushmore system, is a feature of the later Bosch products with decided improvements. The old Rushmore drive is illustrated and described herewith. The Bosch improvements will be taken up later.

The construction of the Bosch-Rushmore motor is such that the

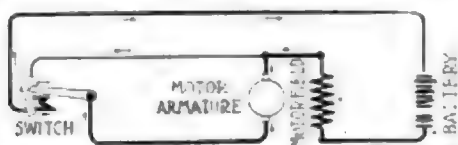


Fig. 206—Electrical circuit of Bosch system with switch pedal in first part of downward movement

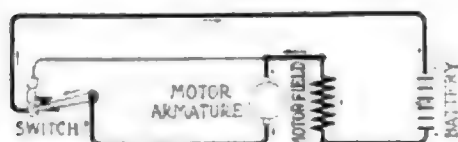


Fig. 207—Here the switch pedal has completed the downward movement and the engine turns over

armature can be shifted endwise in its bearings. In the non-operating position the armature is held out of its electrical center or, in other words, out of line with the pole shoes, by a spiral spring in the commutator end of the armature shaft; therefore, when in the normal position, the pinion on the driving shaft of the starting motor is out of mesh with the gear ring on the flywheel of the engine. A sectional view of the motor is shown in Fig. 205.

The motor is provided regularly with three terminals, two of which are heavier, or of larger diameter, than the other. The two heavier terminals are for the main circuit, and the single small terminal is for the shunt circuit.

During the first part of the downward movement of the switch pedal an electrical circuit is established, which causes the current from the battery to pass through the switch shunt. The amount of current that can flow is limited by the resistance of the circuit, but of the current which passes through the switch shunt a small portion is allowed to flow through the motor armature, while the greater portion flows through the motor field coils, forming thereof a strong electromagnet. See diagrams of electrical circuits as given in Figs. 206 and 207. The result is a powerful attraction between the field coils and the armature, causing the latter to be drawn endwise into the magnetic center of the motor or, in other words, into its working position between the pole shoes. The passing of the small current through the armature causes the armature to rotate slowly, and as the rotary motion occurs simultaneously with the shifting of the armature endwise, the meshing of the motor pinion with the gear ring on the engine flywheel is accomplished quickly and positively.

Operation More Rapid Than Explanation

As the switch pedal reaches its limit of motion the flow of battery current through the switch shunt, as well as that through the shunt cable to the field coils, is interrupted, and a straight series motor connection is established, allowing the entire current to pass through the motor field and armature windings and causing the engine to turn over until it starts firing. Although it takes time to explain this series of actions, the entire operation takes place so rapidly that the impression on the observer is that the motor pinion slips into place and begins turning the engine flywheel immediately after the starting switch pedal is depressed.

As soon as the engine starts the starting motor is relieved of its load, and the current passing through it drops rapidly in volume, this being a characteristic of series motors. In consequence, the strength of the field magnets is lessened to a point where the spiral spring in the end of the armature shaft overcomes the magnetic attraction holding the armature and returns it to the original, or non-operating, position. It is this action that automatically and positively throws the armature shaft pinion out of mesh with the flywheel gear ring. Thereafter, until the starting switch is released, any current which continues to pass through the armature merely will cause the latter to revolve freely but without meshing with the flywheel, due to the fact that the amount of current utilized when the motor is running free is not sufficient to overcome the tension of the spiral spring. The non-operating position of the armature is shown in Fig. 208 and the operating position in Fig. 209.

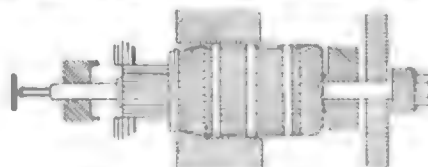


Fig. 208—Armature of Bosch starting motor in non-operating position

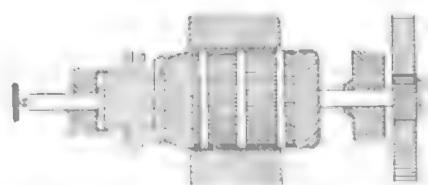


Fig. 209—Armature of Bosch starting motor in operating position



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Figure 1. A person lying down, possibly on a bed or couch, with their head resting on a pillow. The person is wearing a dark, long-sleeved garment. The background is light and slightly out of focus.



The Motor Car Repair Shop

It Is Not Too Late for a Heater

MOTOR AGE readers are remembering the golden rule and answering our request for ideas to benefit the other fellow in the repair shop. Here are two good ones for this week. It is not too late yet to build a heater. There is plenty of cold weather coming, and it would be a good time to fit that heater when you have your car torn down for overhauling. Vernon Bowen tells you how to build one.

J. Edgar Finn tells you how to remove cylinder heads and put them back on again without having to replace the gasket every time. Some repairmen have the idea that removal of the cylinder head spells doom for the gasket, and with this idea in view they gouge and hack it to pieces in the process of removing the head. It is not necessary. Finn tells how to avoid it.

The ideas are good ones, both of them. So far the reader's batting average is high and the hints received are all helpers. Let's have some more.

About Removable Heads

Brooklyn, N. Y.—Editor MOTOR AGE—In removing and replacing the removable cylinder head I have found the following method to be the easiest and quickest:

Drain the water from the radiator.

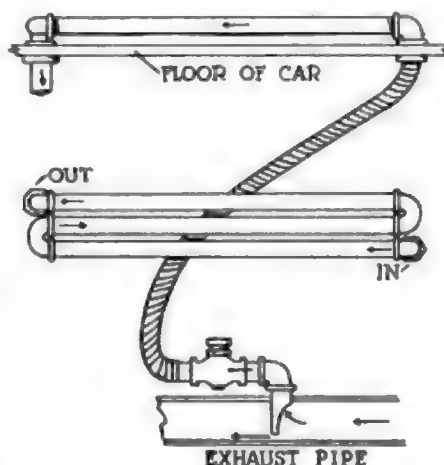
Remove all connections from the head, such as water hose and electrical connections and spark plugs. Remove studs, being sure to use the correct size of wrench. Nothing is more troublesome than a rounded or burled bolt or nut.

When the head is clear of all fastenings, a few light taps, not blows, with a hammer as a rule will loosen it from the seat and it can be lifted off easily. Do not attempt to force it by prying off with a sharp tool, as this will ruin the gasket. With a little patience and two pairs of pliers, by getting above the head and grasping two petcocks or water outlets and lifting evenly the most stubborn fit will yield.

When ready to replace, lay the gasket, which in most cases is composed of two pieces of copper or brass sheet, with some fireproofing material in between on a smooth surface. Clean this thoroughly on both sides with fine emery and wipe off, taking precaution not to bend the gasket.

See that the head seat and cylinder seat are free from dirt, as if left on this will prevent the gasket seating evenly.

Spread some medium-grade lubricating oil in a film over both sides of the gasket. Do not attempt to use red lead or shellac, as it not only makes a mess, but on tightening the head it will run or be squeezed in on the pistons, cylinder walls and valves, getting on the seats and preventing them



A home-made car heater made from galvanized pipe, flexible tubing and standard hardware

from seating properly, eventually causing trouble, ruining the gasket and making it a difficult job to remove the head again. After oiling the gasket, replace evenly and put on the head. In tightening the bolts or studs always tighten the center studs first. Then tighten the center studs of the outside and lastly the studs on the farthest edges. Draw them all down a little at a time and go over them again and again until everything is tight.

By using the above method and a little patience, I have experienced no trouble from any source and the head gasket will last indefinitely.—J. Edgar Finn.

Is the Tube Done For?

When is an old tube worn out? It is a rather difficult matter to determine whether or not a tube has reached that stage of deterioration where it is unfit for use. There is one sure sign and that is porosity. This is the stage where very small cracks can be observed in the rubber when its surface is stretched.

As long as the rubber of an inner tube is alive, it will take patches. The old saw, "there is always room for one more," well may be applied to patching tubes. The method of vulcanizing has a great deal to do with the retention of the alive qualities in the tube and the number of patches it will take. If portions of the tube have become overcured in patching, the rubber which is overcured is dead and is going to give trouble.

Heat is injurious to rubber. If there is an insufficient quantity of tale between the tube and the casing, heat is generated from the friction, and the tube often is vulcanized to the fabric of the casing. Then you

wonder why the tube tears when you try to remove it.

A source of tube splitting is in slippage of the tube between the casing and the rim. This results in pinched tube. Careless insertion of the tube is the reason for this.

Spare tubes should have careful protection. They should be kept in oil-tight and dust-tight cases or boxes. The imitation leather tube cases available at any motor car or tire supply house are excellent for this purpose.

A Home-Made Heater

Seattle, Wash.—Editor MOTOR AGE—The following plans for a cheap and easily-made heater may be of interest to MOTOR AGE readers.

The heater itself is made of $\frac{3}{4}$ -in. galvanized pipe. Three pieces of equal length are threaded at both ends. These are connected parallel to each other with two elbows and two straight Ls. The two open ends are fitted with elbows, and into each of these elbows are screwed long nipples. This completes the heater itself. Of course the length of the heater is limited by the inside width of the car floor.

Next a hole is cut in the exhaust pipe well up toward the engine. A long nipple is brazed in. Before fitting this it should be cut off at a long angle and placed in the pipe so that the opening is facing toward the engine to catch and deflect into the heating system more of the exhaust gases.

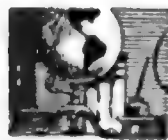
To the top of this is screwed an elbow facing toward the back, and a shutoff valve fitted. From the valve a short nipple will complete this assembly.

The heater is now mounted permanently to the floor of the car. Two 1-in. holes are drilled, and a $\frac{3}{4}$ -in. nut run well up the end nipples and the heater set in place. Two more nuts are run up the nipples from below the floor boards and locked hard.

The connection between the heater proper and the valve is made easily with one long piece of $\frac{3}{4}$ -in. pipe, threaded at both ends, and two pieces of 1-in. flexible tubing. The tubing will screw around the $\frac{3}{4}$ -in. pipe and needs no clamps, as the threads hold it fast.

A much more finished job can be had at more expense by slipping brass tubing over the heater pipes and using brass elbows. I made mine 3 years ago and it has been satisfactory in every way. The robes can be fitted with eyes in the corners and buttons mounted on the back top bows. Then the heat from the heater will be retained and the car will be made very comfortable.

Vernon Bowen.



The Readers' Clearing House



WHY SPRINGS HUNG OFF CENTER Difference in Vibration Period Gives Shock Absorbing Effect

WITTENBERG, Wis.—Editor *MOTOR AGE*—Why is a semi-elliptic spring usually hung off center? That is, why is not the center bolt placed exactly in the center of the spring?—Leslie S. Little.

To afford a shock absorbing effect within the spring itself. The period of movement in one spring is faster than in the other. Take as an example a long spring board and a short spring board. Jumping up and down on the long spring board gives slow, smooth strokes, while jumping up and down on the short spring board gives short and more rigid strokes.

The long end of the spring has a slower action than the short end. Here is what happens. When the car encounters an obstruction the jolt is of course transmitted to the spring. The long end is easier to bend than the short end. Therefore the short end is constantly pulling against the long end, affording a cushioning effect and lessening the rebound. It is this difference in the period of vibration and the consequence of one end of the spring pulling against the other, that is the reason for the construction.

SKETCH OF CUT-DOWN CARTER CAR

Cannot Place Seats Low Because of Friction Disk

Buffalo, Mont.—Editor *MOTOR AGE*—Furnish me with suggestions for converting a model H Cartcar into a speedster.

2—Can a worn cylinder be lapped in by the use of an oversized piston and emery and a good job made of it?

3—Where can one secure complete information on the subject of lapping in?—W. G. P.

1—The illustration in Fig. 3 could be worked out very well with this car. Because of the distance which the friction disks rise above the frame it would be impossible to convert this car into a typical stripped speedster with bucket seats placed on the frame itself.

2—Yes. A fine grade of emery powder must be used.

3—The method of lapping in pistons was explained on page 37 of the Jan. 18 issue of *MOTOR AGE*.

WANTS TO SLEEP IN STOCK CAR Believes Warner, S. D., Reader Misses One Point

Editor *MOTOR AGE*—The letter from a reader in Warner, S. D., printed in the Feb. 15 issue of *MOTOR AGE* is a good one. It expresses the sentiments almost exactly as to what a touring car should be. But there is one thing he has left out, and that is a place to sleep.

Now we cannot all afford to stop at expensive hotels, and sometimes road conditions are such that we cannot get to a town at night, or a breakdown happens

IN WRITING AN INQUIRY to the Reader's Clearing House Department

DESCRIBE THINGS COMPLETELY!

If your car is giving trouble, tell us all about the trouble and what you have done to try to remedy it. Always bear in mind that we are not looking at your car when we are reading your inquiry. Try to picture everything to us as we might see it if we were looking at your car. You understand it. Make us understand it.

Do not write in and say, "My engine has developed a serious knock. What is the trouble and how can I remedy it?" It is as impossible to give an intelligent answer to such a question as it is to answer the question, "Why is a mouse?" Tell us where the knock is, what it sounds like, what effect it has on the operation of the engine, under what driving condition it is most evident, etc. Let us have some tangible information to work on.

Do not ask us questions concerning motorcycles and motor boats. Our field does not cover these industries. Do not ask us for working drawings of engines, gearsets, etc. We endeavor to conduct an information department, but not an engineering department of such a nature. We cannot design the mechanical units of a car for you. This also applies to specifications for speedster bodies to be applied to touring or roadster equipped chassis. We will gladly give a general plan of a body, showing how it might appear when complete, but we cannot furnish complete patterns and working drawings for the construction of these bodies.

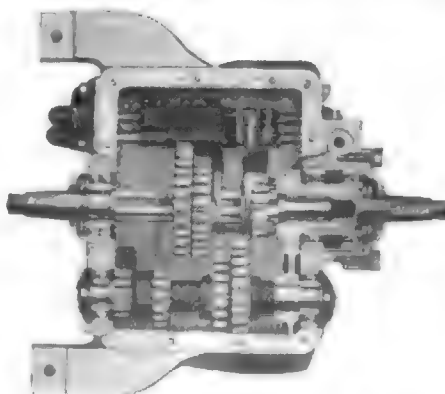


Fig. 1—View of gearset used in 1915
Jeffery Chesterfield six

and we have to seek shelter at a farm house. How much more convenient it would be if the so-called touring car were fitted up so that we might pass the night in it. This could be done easily by hinging the back of the front seat so that it could be let down to form a bed. This, and a place to carry baggage, would make a touring car ideal.

I would like to see an article in *MOTOR AGE* on this subject. Some of your readers might be able to give information as to how this could be done.—A Subscriber.

Editor's Note—*MOTOR AGE* would be glad to give space to illustrations and descriptions of cars which have been converted to permit sleeping quarters. If any readers have built their cars over or had them built over for this purpose, we would appreciate photographs that we might print and enlighten such readers as the one who sent in the above communication.

NO RECORD OF GAS CONSUMPTION

Amount Used at Different Speeds Depends
on Make and Adjustment

Thibodaux, La.—Editor *MOTOR AGE*—Has *MOTOR AGE* any record as to the consumption of gasoline at different speeds of a motor car?

Has there ever been any reliable test to that effect? For example, if a motor car is running at the rate of 10 m.p.h. and makes 30 miles on a gallon of gasoline, how much would that same car do on a gallon, running 15 m.p.h.; at 20 m.p.h.; at 25 m.p.h., and at 35 m.p.h.? The majority of car owners believe the faster they go, the more mileage they get out of a gallon of gasoline. I know it to be the contrary and would like to have statistics to prove it.—P. L. Braud.

1—There are no records of general tests covering this. It is such a variable that a test conducted with one make of carburetor would not apply at all to another make of carburetor. You are correct in your assumption that the theory of high speed and low gasoline consumption is incorrect. There is an efficient speed ranging around 20 or 25 m.p.h. Above this or below it the gasoline consumption per mile is greater. However, here again comes in the great variable. An improperly adjusted carburetor may give results just about the opposite.

ELECTRICAL SYSTEM ON MAXWELL

Wants to Install Starter and Generator on
Old Model

Shinglehouse, Pa.—Editor *MOTOR AGE*—I am the owner of a Maxwell 25, year 1914, and would like your advice as to whether an electric system could be installed on this car. My idea was to gear the flywheel and use a Bendix drive on the starting motor and to install a generator on the same shaft that runs the magneto with a distributor.

1—What pitch would I have the flywheel teeth cut?

2—Could the starting motor be put on the right hand side of the motor, the Bendix drive towards the back of car?

3—Could the generator be run in place of magneto at the same speed or would it have to be geared up or down?

4—What would be the estimated cost of the system not installed?

5—Would I be able to purchase a second

hand system and would MOTOR AGE advise a second hand system?

6—Where could I purchase a system for this car, new or second hand?—Donald Haines.

1—It would be an expensive installation, probably considerably more so than you realize. The pitch of the flywheel teeth would be regulated by the pitch of the pinion on the starting motor.

2—Such an installation could be made—at a big expense.

3—Magneto speed would take care of the generator.

4—Probably \$150 or more.

5—A second-hand system would be satisfactory if it was in good working order and could be made to fit.

6—You would have to look around for it. Possibly you might find a very good second-hand system that could be fitted to your car at some electrical shop. If you were to buy a complete new system and go to the necessary expense of having special fittings made and the cost of installation, you would find yourself tied up in \$200 or \$300, and we do not think it is worth it. You could probably save money by selling your car and buying a used car equipped with a starter.

OPERATION OF BIFUR GENERATOR Generator of Constant-Voltage Type— System Explained

Detroit—Editor MOTOR AGE—Explain in a clear and concise manner the underlying principle of the Bifur generator as used in Packard cars. As I understand it, the swinging of the connecting plug in the regulator from side to side has no effect whatever on the charging of the battery.

What are the sizes of the field and armature windings of the starting motor of this system? Is a wire or a copper bar used for winding?

The generator used on the Packard is of the constant-voltage type. The voltage is maintained constant irrespective of speed and load by means of a vibrating regulator which is shown diagrammatically at B in Fig. 2. Connected in series with the shunt field winding of the generator is a resistance which is alternately inserted and removed from the circuit field. When the resistance is removed from the circuit, the field is connected directly across the generator brushes. The rest of the diagram is self-explanatory and needs no further comment.

Shifting of the disconnecting plug in the

regulator box from side to side has no effect whatsoever on the charging current. The object of shifting this plug in its socket is to reverse the polarity across the regulator contacts. Metal is carried from the positive contact to the negative contact, building up minute projections on the negative and forming corresponding recesses in the positive. When reversal takes place the material which was deposited from the original positive contact is re-deposited on this contact so that, if reversal is made regularly the life of the contacts is indefinite.

Inquiries Received and Communications Answered

Leslie S. Little.....Wittenburg, Wis.
W. G. E.....Buffalo, Mont.
A. Subscriber.....Detroit
P. L. Braud.....Thibodeaux, La.
Donald Haines.....Shinglehouse, Pa.
H. C. Bland.....Mayesville, S. C.
H. J. A. Ulmer.....Cincinnati, Ohio
Roy B. Bantly.....Johnstown, Pa.
Nell C. Baworth.....Warren, Pa.
Charles E. Barton.....Gloversville, N. Y.
W. P. Walsh.....Ludlow, Ill.
H. Edgar Finn.....Brooklyn, N. Y.
H. G. Spellmeyer.....Melvin, Ill.
D. H. Jones.....Chicago
H. F. Price.....Webster City, Ia.
L. J. Wilcox.....Fairport, N. Y.
Reader.....Topeka, Kan.
L. P. Hurm.....Overpeck, Ohio
R. J. Weber.....Chicago
A. H. Allison.....Hammond, Wis.
William Ellis.....Beattie, Kans.

ENGINE STARTER A SHOP MOTOR

Article Explains Method of Converting for Above Use

Mayesville, S. C.—Editor MOTOR AGE—I have a Gray & Davis type K starter and generator which came off an Overland of 2 or 3 years ago, both of which I wish to use as motors for constant use about the shop to be used on 32-volt Deleo lighting outfit which I am using. I am using the generator now as a motor by connecting the 32-volt current through the brushes only, which seems to be a strange way to use it. Why is it that I do not have to use the field coils at all in the generator to make a motor of it?

2—What will be necessary in changing the motor so it will use a small amperage, say not over 10 amp. where it now uses 100 amp. of 6-volt current? I thought by

re-winding the armature with suitable size wire and re-winding the fields I could get a very good motor for the 32-volt current, and as this has an internal reduction gear in it, it would make a powerful motor for slow speed work about the lathe and drill press. Tell the size wire for fields and armature and the proper way to connect the fields through the brushes.—H. C. Bland.

This is described and illustrated in detail on pages 24 and 25 of this issue.

WANTS NEW BODY ON SAXON SIX Illustration Shown Carrying Out Reader's Ideas

Cincinnati, Ohio—Editor MOTOR AGE—I am sending a sketch showing a speedster body applied to a Saxon six. Where could I have such a body made?

2—What would be the approximate cost of such a body?

3—The new equipment such as Miller carbureter, Bosch magneto, Leavitt pistons, etc., would be put on by myself.—H. J. A. Ulmer.

1—This is a job for some coach working establishment and we think you might find someone in your locality who could handle it for you. Following are the names of a few concerns who specialize in bodies made to order: Charles E. Schutte, Lancaster, Pa.; Auto Remodeling Co., 1501 Michigan Avenue, Chicago; Detroit Auto Products Co., 38 Sherman Street, Detroit; Lehman Mfg. Co., Cannelton, Ind.; Auto Sheet Metal Works, 2301 South Wabash Avenue, Chicago; Wright, Cooler & Hood Mfg. Co., 4867 North Clark Street, Chicago, etc. You might submit the sketch shown in Fig. 6 for quotations from the above concerns.

2—Probably between \$300 and \$400.

3—The illustration as shown is designed for an 8-in. one-piece windshield, wire wheels and cord tires, etc. The entire rebuilding job with the new equipment which you would have to purchase would probably run into a figure around \$700 or \$750.

More Power From Detroit

Johnstown, Pa.—Editor MOTOR AGE—Kindly tell me how I can get more power out of Detroit eight. The compression is good in all cylinders.—Roy B. Bantly.

You ask us one of those impossible questions that has no enlightening answer. You do not tell us whether the car has lost its original power, the condition of the engine, how much it has been run, in fact, you give us no information concerning the car, nor do you tell us why you want more power or how much you are willing to spend to get more power.

Gear Ratio for Ever Ready

St. Louis, Mo.—Editor MOTOR AGE—I have an Ever Ready speedometer. Inform me what gear ratio this meter should have, using a 31-in. tire.

2—Can MOTOR AGE give me the revolutions per minute of a model 8 Ford motor?

1—The driving gear should have 70 teeth and the pinion 20 teeth, both to be 10 pitch gears.

2—There is no record of an official speed test on this engine.

Cutting Down Jackson

Blackwell, Okla.—Editor MOTOR AGE—Give me some suggestions for cutting down a 1916

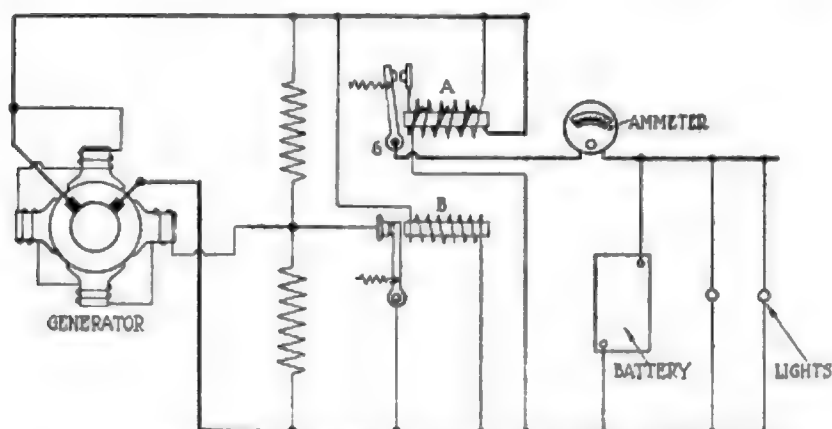


Fig. 2—Chart to explain principles of operation of Bifur system on Packard

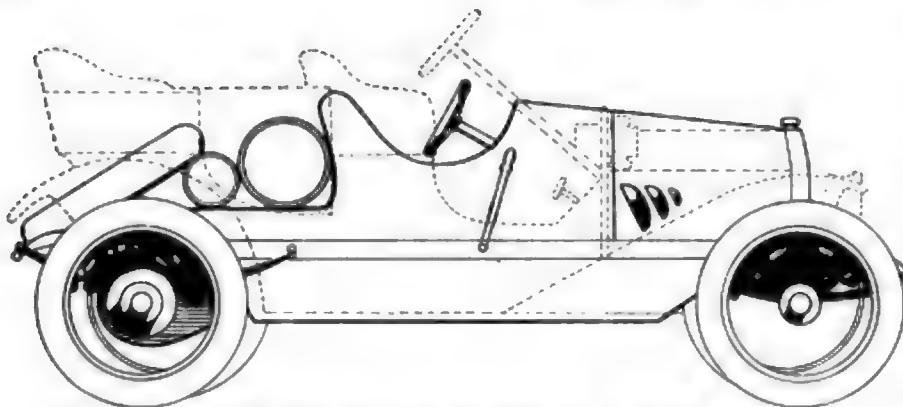


Fig. 3—Suggested body design for use on old Carter car. The seat cannot be real low because of the necessary clearance over the friction disks

Jackson car, model 34, into a racing car.—L. J. Bodine, Jr.

A sketch of how this model might appear if converted into a racing car is shown in Fig. 4. If you did not wish to go to the expense of having a body of this type built up, it would be our suggestion that you strip it with a deck built over the rear and bucket seats fitted with gasoline and oil tanks behind.

SOMETHING ABOUT TOP DRESSINGS

Reader Considers Using Dye to Refinish Top Fabric

Warren, Pa.—Editor MOTOR AGE—Publish a phantom view of the 1915 Jeffery Chesterfield six gearset.

2—As it is overhauling season, just now, why not something about the top? I have used a great number of top dressings and have never found two alike. Most dressings are for Pantasote or cotton tops and make a mohair top stiff, but I also find that most mohair dressings made the top stiffer than before. I was wondering if one could use Diamond dyes and put them on with a brush, but as the lining of my car is brown I wouldn't care to have the black run through.

3—Do you think it would if one were careful? The lining is soiled and I would like to color it a little darker, perhaps gray or a darker brown. I would imagine that there are a number of your readers like myself, so give us some ideas.—Neil C. Ensworth.

1—This is shown in Fig. 1.

2—Mention of top dressing and top care were made in the article beginning on page 5 in the March 8 issue of MOTOR AGE. There will be another article in the near future telling of the different kinds of top dressing and their use. As to the use of dyes we can see no advantage in these over dressings, in fact, they afford no weather proofing, and the dressings do.

3—Dyes are mixed with water and in trying to get an even coat of dye over the top some of the liquid would undoubtedly get through to the lining. If your top has pin holes in it anywhere, and we would wager it has, then the dye will find an open channel to get through and damage the lining. Because of its oily consistency a good top dressing is not going to soak through in this fashion.

USE OF MOTH BALLS IN GASOLINE

Not to Be Recommended as They Sometimes Stop Up Fuel Line

Gloversville, N. Y.—Editor MOTOR AGE—What is the correct number of moth balls to use to a gallon of gasoline, and do moth balls have any injurious effect on the cylinders, spark plugs, or the motor in general?

2—Will the moth balls dissolve entirely, so

as not to plug gas line or carburetor? If so, after the moth balls dissolve, will they settle in the bottom of the gas tank?—Charles K. Burton.

1 and 2—There is little advantage in using moth balls in gasoline as the improvement is not worth the cost. In cold weather there is danger of stoppage of the fuel line due to crystallization of the naphthalene.

STORAGE BATTERY WON'T CHARGE

Supposition That Short Circuit Exists Appears Impossible

Ludlow, Ill.—Editor MOTOR AGE—I have a 6-volt storage battery, 18 months old. For about a year, ever since I have had a hydrometer, the three cells tested respectively, 1.250, 1.240 and 1.210. Last winter I had it disconnected from the machine for 2 months without any change, and it showed no perceptible loss. Thinking the solution was weak from spilling, I sent it to a service station where they tried unsuccessfully to charge it higher. They claim there is a short circuit in it and it must be overhauled. Is it reasonable that such could be the case, without showing any reduction in gravity test for a year?—W. P. Walsh.

The cells test too low, that is evident. However, it is quite unreasonable to suppose that the battery has a short circuit. If such were the case it would not hold its charge as you state. It appears to us that there is something internally wrong, probably with the plates, that will not permit the battery to suspend its full charge.

1912 REGAL WITH TURTLE BACK

The 2 to 1 Gear Ratio Is Too High. Better 2½ or 2¾ to 1

Brooklyn, N. Y.—Editor MOTOR AGE—Illustrate a converted 1912 Regal Roadster made into a speedster with so-called turtle back.

2—What metal and what gauge would you recommend for this work?

3—Have you any suggestions to raise the

r.p.m. of the motor of the above car without undue expense?

4—I understand this model car had a weak countershaft or pinion-shaft bearing in the gearset; in other words some of the gearset bearings on this car have to be replaced every once in a while. They say it comes from using second speed. Would you be kind enough to advise a possible remedy and tell me what causes this? Is it poor material or designing?

5—I would like to put a 2-1 ratio in rear axle of this car. Do you think the clutch, gearset and other driving units will stand this? The car will be used in level country on good roads. If the ratio is not right, will you suggest the highest that can be used?—J. Edgar Flinn.

1—This will be shown next week.

2—Sheet steel, 22 gage.

3—It could be done by properly installed aluminum-alloy pistons and non-leaking rings.

4—Inasmuch as such a weakness has not been called to our attention heretofore we cannot give the reason or remedy.

5—This ratio seems too high. A 2¼ or 2½ would be more nearly correct, in our opinion.

Piston Shapes

Melvin, Ill.—Editor MOTOR AGE—Which type of piston is considered the best and is the most used, a cup, square or ball head piston, and why?—H. G. Spellmeyer.

A piston with a flat or nearly flat head is the best from a production standpoint as it gives good results and is easiest to manufacture properly. The cup head is theoretically the best as it gives a spherical combustion chamber. There is not a great difference in practice.

Motor Vibrates Badly

Chicago—Editor MOTOR AGE—I have a four-cylinder motor which vibrates badly and which has been overhauled several times. How can this be balanced so that it will run smoothly?

2—Should the pistons be equal in weight?

3—Should the lower end or bearing of the connecting rods be of equal weight?—D. H. Jones.

1—No one could tell you how to balance the engine without first knowing why it is out of balance. It could originate in many different sources.

2—Yes, to the fraction of an ounce.

3—Yes. The complete assembly of pistons, wrist pins and connecting rods with bearings should be equal in weight.

Aluminum Piston in Ford

Paulina, Ia.—Editor MOTOR AGE—I am rebuilding a 1914 Ford. The cylinders are badly worn. Would MOTOR AGE advise reboring and fitting with aluminum pistons and connecting rods, or is there a light steel piston that I can use that is better? Is it necessary to put in aluminum connecting rods if I use aluminum pistons, or would I get any better

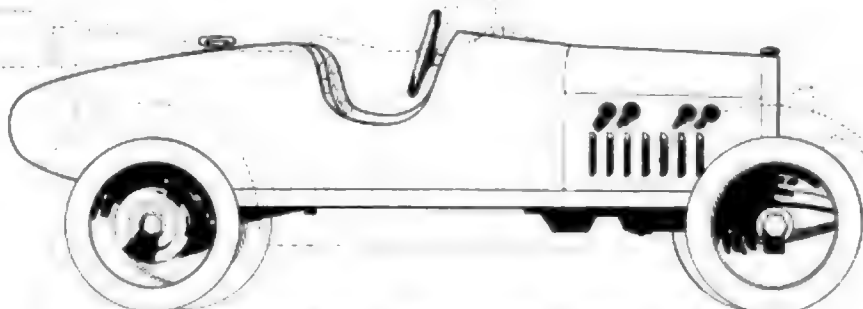


Fig. 4—Speedster body fitted to a model 34 Jackson chassis. This is a true racing type

results by using lighter connecting rods?—J. E. Jennings.

Reboring and fitting with aluminum pistons and non-leaking rings would be an advisable course to pursue. It would not be necessary to install aluminum connecting rods. Lighter connecting rods are an advantage but not as great an advantage as lighter pistons.

Camphor as Carbon Remover

Fairport, N. Y.—Editor *MOTOR AGE*—Will spirits of camphor remove carbon in an engine, and will same injure the engine?—L. J. Wilcox.

Not very efficiently. Will not hurt engine.

Overland Gear Ratios

Topeka, Kan.—Editor *MOTOR AGE*—What is meant by an orphan car? One claims it means the name as an assembled car; another says it is a car that no longer is being manufactured.

2—Give the gear ratios of the 79T Overland.
3—When the regularly used mixture of gasoline, vapor and air will not take a car up a hill, will increasing the richness of the mix give more power?—Reader.

1—A car which is no longer being manufactured.

2— $3\frac{1}{2}$ to 1, $3\frac{3}{4}$ to 1 and 4 to 1.

3—Frequently.

Palmer-Singer Engine Size

Long Beach—Editor *MOTOR AGE*—I have a Palmer-Singer Six, seven-passenger car, about a 1912 model. Where can I get a catalog to explain the various parts of this car?

2—Give the bore and stroke of the motor.
3—Where can I secure repair parts for this car?

4—How can sprocket wheels be put in in place of the rear wheels?

5—Where is the number of the car located.

—N. D. Robinson.

1—Possibly, Singer Motor Co., New York City.

2—Four by 5 in.

3—Singer Motor Co., New York City.

4—We do not know what you mean by this question. What do you want to use the sprocket wheel for?

5—There should be a name plate on the heel board of the car directly under the seat, which bears the car number.

Ford Engine Stand

Montgomery, Ala.—Editor *MOTOR AGE*—Give an illustration of an easily made engine stand to be used in running in Ford motors that are new and stiff or have been overhauled. I intend to build one myself and locate it on my shop floor so that it may be connected through a belt with overhead line shafting. I want the simplest and least expensive thing possible.—Edward J. Kessner.

A simple stand constructed of wood, strap iron and angle iron is shown in Fig. 5. You will note that the regular front bearing bracket of the Ford is applied to

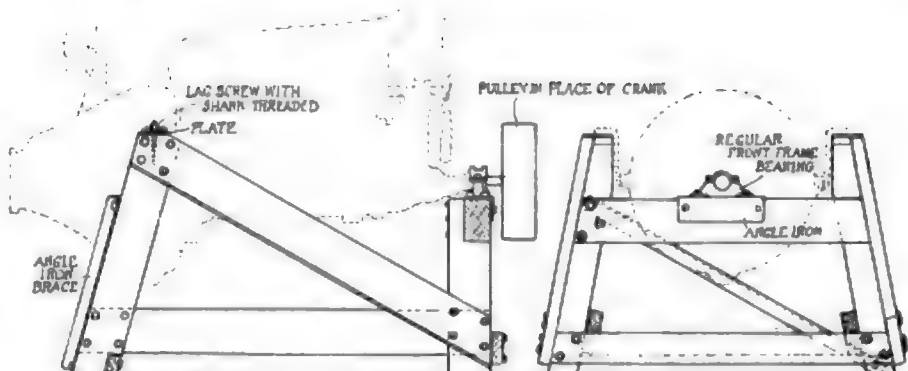


Fig. 5—Simple and easily made engine stand for running in Ford engines

the stand to support the front of the engine.

Parry Pops in Carburetor

Hammond, Wis.—Editor *MOTOR AGE*—I have a Parry that is continually popping in the carburetor. Have changed carburetors and tried a different coil but used the same distributor. It runs on only three most of the time. When it runs on four it does not pop. Is the trouble in the distributor? The valves and everything else seem to be all right.—A. H. Allison.

The trouble is either in the electrical system or in the setting of the valves, we would assume. However, this is one of those illusive troubles which may come from one of a score of defects and it is quite beyond us to direct you to the exact cause from the brief description you give.

Timing 1910 Buick

Overpeck, O.—Editor *MOTOR AGE*—Give the correct timing of valves of the Buick motor, Model 17, 1910.

2—Is there any overlap in the valves? If so, what degree?—L. P. Horn.

1—The exhaust valve should close $\frac{1}{8}$ in. of piston travel past upper dead center, and the inlet valve should open $\frac{1}{8}$ in. piston travel past upper dead center, allowing .010 in. to .012 in. clearance between the rocker arms and valve stems on compression stroke.

2—There is no overlap in these valves whatever.

Value of Two Sparking Points

Beattie, Kan.—Editor *MOTOR AGE*—I have a Stutz roadster. This is a four-cylinder car having eight spark plugs. When more speed is wanted, the extra four plugs are put into operation. Why do the eight plugs give more power on a four-cylinder car than the four plugs do?—Wm. Ellis.

Because they give a spark of double intensity to the explosive mixture, thus giving

more complete and rapid firing. Regardless of the speed of the motor the gas mixture burns at the same speed, if the temperature of the motor is constant. With an engine which is turning over very rapidly, the combustion of the gas is well crowded and the hotter the spark the more liable it will be that all the gas will burn. Furthermore the two plugs spread the spark over the cylinder from two points instead of one point.

Undersliding Ford

Detroit, Mich.—Editor *MOTOR AGE*—Kindly publish a drawing showing how to make a Ford underslung.—Ralph Beers.

See page 34 of the March 1 issue.

Moth Balls and Power

W. Palm Beach, Fla.—Editor *MOTOR AGE*—Will moth balls decrease the strength of gasoline?

2—Will they help to keep the carbon down in a motor if used in gasoline?—A. C. Casner.

1—No. They are supposed to increase the power-giving qualities.

2—No, not practically.

Ford Frame Lowered

Cresco, Ia.—Editor *MOTOR AGE*—In the December 21 issue of *MOTOR AGE* are shown cuts of reconstructed Fords with frames lowered. Could I have drawings of same? I am rebuilding my car and would like to lower the frame.—R. C. Bowers.

See the article beginning on page 43 in the March 1 issue of *MOTOR AGE*.

Remodeling Cartercar

Hastings, Ia.—Editor *MOTOR AGE*—Could a 1912 40-horsepower Cartercar roadster be equipped with a pointed hood and cowl board or dash as the late model cars which are on the market? Also could an electric starting and lighting system be installed?

2—Does *MOTOR AGE* think I could successfully paint this car? Does maroon body and white wheels make good appearance?—Kenneth Dolph.

1—Yes.

2—Yes.

The Why of Wire Wheels

South Bend, Ind.—Editor *MOTOR AGE*—What are the objections to wire wheels?

2—What are the advantages derived from their use?

3—Would it be practicable to use them on cars weighing 2,800 pounds or more?

4—Does *MOTOR AGE* recommend their use? O. P. Nolsom.

1—The only objection is the difficulty in cleaning, and this is an insignificant one.

2—Light weight and added strength and resiliency.

3—Perfectly.

4—*MOTOR AGE* can voice no reason against their use, if that is what you mean.

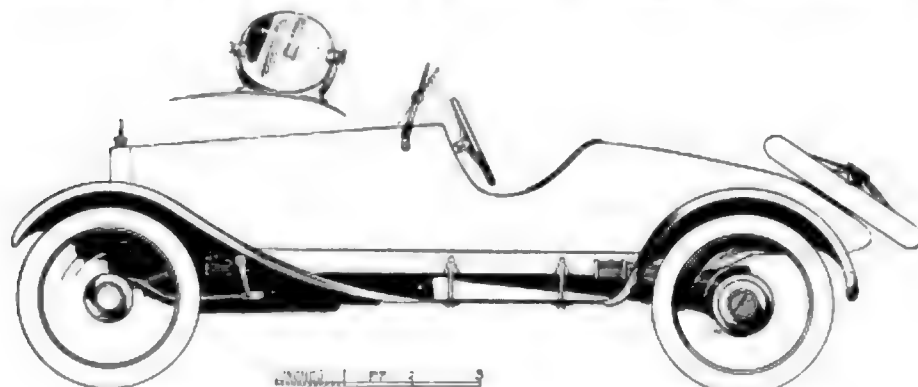


Fig. 6—Speedster body on Daimler chassis designed after ideas of Motor Age reader





THE FUTURE OF THE PAPER



THE FUTURE OF THE PAPER





MOTOR AGE

Special 1957
Preview



Springfield

1957
1958
1959



MOTOR AGE

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Vol. XXXI March 22, 1917 No. 12

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ANNOUNCEMENT

The feature of Motor Age for next week will be
"When This Circus Comes to Town." In it you will
learn what the small boy of today will be racing off to
meet when the new circus, the motorized circus, is
coming into town.

"NORMA" BALL BEARINGS

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Trunking

1. *Journal of the American Medical Association*, 2000; 283: 2689-2693.

<p> 1. <i>What is the purpose of the study?</i> 2. <i>What are the research objectives?</i> 3. <i>What is the research methodology?</i> 4. <i>What are the results of the study?</i> 5. <i>What are the conclusions of the study?</i> </p>	<p> 1. <i>What is the purpose of the study?</i> 2. <i>What are the research objectives?</i> 3. <i>What is the research methodology?</i> 4. <i>What are the results of the study?</i> 5. <i>What are the conclusions of the study?</i> </p>
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100



Figure 1. A large, dark, abstract image, possibly a photograph of a landscape or a close-up of a textured surface, rendered in grayscale.







THE LITTLE BOOKS



THE LITTLE BOOKS



Figure 1. A large, dark, rectangular object, possibly a piece of furniture or a large box, standing in a room.



Figure 2. A large, dark, rectangular object, possibly a piece of furniture or a large box, standing in a room.

Resta Out of the Races?

Speedway Champion Says He May Not Compete This Year

Peugeot Contract Is Reported to Be Unsatisfactory

CHICAGO, March 16—The king of the speedways may not be seen at the wheel of the blue Peugeot this season. After capturing four speedway classics and the Vanderbilt cup road race last year and winning the 1916 A.A.A. championship and all that the term implies, Dario Resta announces that he probably will not drive this year.

Two reasons are advanced for Resta's retirement. It is said that he is not satisfied with his contract with Alphonse Kaufman, owner of the Peugeot in which Dario scored his American triumphs, and also that his wife, a sister of the late Spencer Wishart, fears that he will meet the same fate as her brother, who was killed at Elgin in 1915.

Although Resta has been offered a position on the Hudson and the Mercer teams, he probably will not accept either. He is said to be seeking a position as a consulting engineer or an opportunity to invest \$40,000, his share of the purses he has won in this country, in a business less hazardous than driving racing cars.

The prize money that Resta has won in this country in two years totals \$100,000. Of this sum, \$53,000 was contributed by the management of the Chicago speedway, where he proved to be invincible and took six races out of as many starts.

CHICAGO PLANS SELLING RACE

Chicago, March 17—An innovation of a speed contest is planned for the curtain-raiser of the Auto Derby at the Chicago speedway June 9. This will be a 100-mile contest for pleasure cars, not special racing machines, in which each car is to have a fixed price at which it will be offered for sale when the event is over. A silver cup and medal will be the prizes. The speedway association asserts that among those in prospect are Mercer, Cadillac, Haynes, Hudson, Marmon, Packard and National entries.

Strictly professional drivers are barred from competition, but motor car dealers who are not classed as amateurs by the American Automobile Association, as well as private owners, will be eligible. No prize money will be given, a silver cup being awarded the winner and medals to the drivers finishing second and third.

In fact, the proposed race is a combination of the amateur and dealer's events that were held on Chicago speedway last year with the car-selling feature added. With motor car distributors along motor

row and individual owners in their clubs championing the speed and stamina of the cars that they represent or drive, the Chicago speedway officials believe that such a race will be a success, for the rivalry and enthusiasm already exists and all that seems to be needed is a field of battle and a definite date for the settlement of the spirited dispute.

The selling race will be held in the morning, the cars being sent away at 10 o'clock so that the event will be over by noon and the course clear for the professionals who will start their chase of prize money in the Auto Derby at 2.30 p. m.

DE PALMA GETS READY

Chicago, March 16—Dario Resta may be determined to withdraw from the racing arena, but not so his famous rival, Ralph de Palma, for the latter is more ambitious than ever and promises to appear in every important race staged in the United States this summer. He was the first entrant for the Indianapolis Decoration Day races, nominating two cars, the familiar cream-colored Mercedes and the other a Peugeot.

A remedy for the skittishness displayed by the Mercedes on several occasions last year has been attempted by rebuilding the machine and installing a new engine. There is little left of the original Mercedes except the name, inasmuch as virtually every part of the present car is a product of de Palma's own shop.

The Peugeot will be reconstructed in the Allison shops at Indianapolis, and it is expected that the pilot for this car will be the racer's brother, John de Palma.

DEMONSTRATING DRIVEAWAYS

Chicago, March 16—Driveaways as a means of combatting the freight car shortage, has not been confined to the factories, for the dealers and branches are making use of them, and new phases of the value of this means of transportation are asserting themselves daily. Driveaways from the Chicago distributors of the Chalmers Motor Corp. were featured this week. To get the benefit of the \$1,090 price which was raised to \$1,250 recently, scores of Chalmers' dealers, unable to obtain cars in time via rail, made the trip to Chicago and drove their cars home overland.

Ford is also distributing cars by like means, and the assembly plant at Chicago is the scene of almost daily driveaways, dealers within a radius of 300 miles of the plant resorting to this way of getting their cars.

The driveaway system has demonstrated its advertising value in more ways than one. At first the uniqueness of the idea attracted, but now that this has become quite commonplace, attention is called to the fact that the manner in which the machine stands up after these long drives is a strong argument for the sale of that particular car.

34,000 Tractors in Use

Government Census Shows Illinois Operates More Than Any Other

Nine States Have More Than 1500 Each

WASHINGTON, D. C., March 19—More than 34,000 farm tractors will be used during the coming season, according to the United States Department of Agriculture, which has obtained its data through letters sent to 32,000 selected correspondents. The estimate includes only those gasoline and kerosene tractors which are to be used in farm operations this season. Steam-driven tractors, tractors purchased but not delivered and tractors employed for road or other than farm work were excluded.

Illinois, it is estimated, will use more farm tractors than any other state, or 3202. Kansas will use 2287; Texas, 2235; Iowa, 2223; North Dakota, 2137, while California, Indiana, Minnesota, Nebraska and South Dakota will use more than 1500 each, it is estimated.

The figures for the Eastern states agree closely with those of the West. Some of the Western states, however, are not as well represented in the table of estimates as they might be, owing, it is explained, in part to the abandoning of tractors too old for work and to the less intimate knowledge of tractors the reporters in some districts would have than would those in the more thickly populated and smaller counties of the East.

CINCINNATI SPEEDWAY PREPARES

Cincinnati, O., March 16—In anticipation of the coming racing season, the Cincinnati course is assuming the aspect of a spring training camp, many of the drivers and star pilots being already on that boardway trying out their cars. This city enjoys the advantage of having the most southern race course in the United States, besides one of the fastest, and therefore attracts all drivers. June 23 will open the season for Cincinnati, following the events at Indianapolis and Chicago.

S.A.E. TO ASSIST

Atlantic City, March 14—The Society of Automobile Engineers to-day appointed what is known as a steering committee, whose duty it is to discover all the ways it is possible for the society membership to cooperate with the government in military matters. The committee of three consists of: Geo. W. Dunham, president; W. H. Vandervoort, past president, and Jesse G. Vincent, member of the S.A.E. Council. This committee expects to make thorough investigations at Washington and to report

to the society at the next meeting of the council.

With the object of increasing the finances of the Society of Automobile Engineers the Council has practically approved of a submitted plan by which it is hoped to raise upward of \$500,000 by subscriptions as an endowment fund for the society. The revenue for this amount, according to the plan, is to be used for such work as standardization, research, educational and government co-operation. For over a year Christian Gird, president of the Auto Parts Co., Cleveland, Ohio, and also on the finance committee of the society, has been working on a plan for this endowment. The plan embraces subscriptions from a wide range of manufacturers and others connected with the motor car and accessory industries.

The disposition of the endowment will rest with the committee of five made up of three past presidents of the society and one member each from the motor car industry and the accessory industry.

So successful has the two-day session of the Council held in this city yesterday and to-day proved that it was voted to hold the April meeting of the Council in French Lick, Ind., April 16 and 17.

The S. A. E. Council completed to-day broad plans for the big membership campaign for the month of April. The plan is to add 1000 new members so that the society will have a bigger representation for co-operation with the Government in any and all matters. The plan is to have each existing member secure one new one. The seven sections of the society have been asked to appoint special committees and make a broad canvass of all factories in their localities. From these factories the names of eligibles will be compiled, and beginning April 1 an aggressive campaign of each section instituted. In forty or fifty cities where there are not sections special committees are being appointed for membership work. These committees are compiling names in the same way as the sections.

To assist the standing membership committee of the society in its work, the Council voted to engage a special clerical force for the exclusive use of the membership committee during April. R. O. Gill, chairman of the Membership Committee, Saxon Motor Car Co., Detroit, will have complete charge of the work. This committee will hold luncheon meetings every day during April.

DETROIT SECTION MEMBERSHIP

Detroit, Mich., March 16—At the meeting of the Detroit section held at the Pontchartrain last night the membership reached 916. This is a gain of 128 in the last week. The objective point is 1000 by April 1, and at the rate at which applications are coming in this will be attained. During the last month the gain in membership was 300.

Born of Necessity

Ideas Evolved to Combat Effect of Possible Strike Show Forethought

Plans Made Considerable in Advance to Meet the Situation

CHICAGO, March 20—With the possibility of a railroad strike being called, motor car and accessory dealers looked ahead and attempted to formulate plans for continuing their business as long as possible. A canvass of the situation in Detroit showed that the factories are not well supplied with all necessary parts and materials, but have a supply to last only a few days or a week. A strike of one week's duration would have put practically the whole industry in Detroit out of the running. The supplies of tires as far as can be learned is in fairly good shape, and dealers in the Central West contemplated bringing stocks overland by truck if necessary.

Congestion and frequent embargoes on freight shipments during the last few months have taught distributors a lesson, and they realize that preparedness is a necessary safeguard to business. During the last winter a dealer in Louisville, Ky., has put an empty barrel in each freight car coming in with motor cars for him and consigned the car back to the factory. It cost \$25, but the factory stood half the expense and he has been able to get his motor cars delivered when others could not.

More Trucks for Transportation

St. Louis truck makers looked forward to a big increase in sales of commercial vehicles if the strike had materialized. They were prepared to furnish trucks for hauling coal from the nearby mines and for other freight service. Some of the cities on the seaboard and on navigable streams did not look forward to a shortage in fuel to any great extent, though tank steamers have not been plying the waters so frequently as they once did. Dealers and garage men laid in a supply of gasoline and in no city did the situation seem to presage a shortage of fuel unless the strike lasted a month. They were prepared for the emergency.

Dealers in the Central West felt that they could cope with the situation by driving cars through as many of them are doing now. In Columbus, Ohio, the Buick dealer has not received a car by rail since December, so with this condition having been met, the only thing to fear was that the factories would be unable to keep producing cars.

Investigation of possibilities of transportation of cars from factories to Chicago and points in that territory brought out

the fact that it would be possible to ship direct by boat from lake points to Chicago, if the cars were knocked down, and that the difference in freight rates between railroad and steamer would pay for the assembling. For Michigan inland factories, freight service on electric roads to lake points could be made to serve.

The territory in the neighborhood of Chicago is particularly fortunate as regards supplies of gasoline, some of the largest refineries and stores of fuel in the world being at Whiting, only 17 miles away. Territory within a radius of 200 miles could be served by truck, as it is done to some extent now.

VANDERVOORT ON COMMISSION

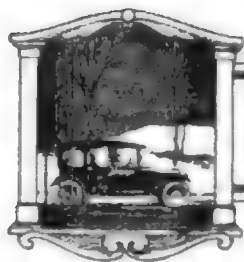
New York, March 19—W. H. Vandervoort, president of the Moline Automobile Co., East Moline, Ill., and past president of the Society of Automobile Engineers, has accepted the appointment on a government commission which will have to do with standardizing ammunition for U. S. A. It is generally known that for the last two years the Moline company has in addition to its motor vehicle business and its gas engine work built large quantities of ammunition for the European belligerents. Mr. Vandervoort should be well qualified for his new position.

CHICAGO GETS TAXI STANDS

Chicago, March 20—With the passage of the new traffic ordinance barring parking in the loop district after May 1 came a cry from the taxi concerns that unless they were allowed stands in the downtown district they would be unable to maintain their rates, since they would be obliged to garage their cars some distance from the loop and thus could not give as quick service nor operate at so low a cost. This cry has been heard by the city council, and consequently that body has passed an ordinance providing for fifty stands, beginning May 1, thirty-one of these being in the loop and the others in districts close to the downtown district. Stands also will be maintained on the South, West and North sides of the city, which has not been done to any extent heretofore.

NEW AUTO PARTS POLICY

Chicago, March 16—At the annual meeting of stockholders of the Auto Parts Co. held recently an entire new board of directors was elected. With this change, a new policy was adopted, said to be unusual in the accessory field. Heretofore, a considerable portion of the business has been consumers' trade, and as this company has an active mailing list of consumers totaling almost half a million, it is rumored that the change will affect this end of the business. Details of the plan will be announced later. No new capital has been brought into the company, statements to that effect in Motor Age issue of Feb. 1, being incorrect.



EDITORIAL PERSPECTIVES



Where Shall We Park?

ACCORDING to a very accurate census made in the city of Chicago during the summer months of 1916, there was an average of 68,000 vehicles each day entered the $\frac{3}{4}$ of a square mile that comprises the heart of the business district of the city. Of these a very large percentage represented the cars of business men, who left their cars either in the loop, as this area is known, or parked them in the municipal parking space on its outskirts. Other large cities have similar reports to make, and in all of them there is this same cry of "Where shall we park?"

FORCED by the physical law that two bodies cannot occupy the same space at the same time, municipal authorities have enforced regulations prohibiting parking on congested streets in order to permit pedestrian and vehicle traffic to move with some degree of safety and dispatch. They are succeeding in clearing the streets of stationary vehicles, but they are

robbing the motorist business man of his opportunity of increased efficiency through the use of his car and are forcing him to add his bulk to increase further the overcrowding of the public utilities' transportation service.

IT is not the resident motorist alone that suffering from the present lack of accommodations during the business day. The visitors within our gates are like sufferers. We owe something to them. To fail to provide adequate means of parking tourists' cars is as reprehensible as for a host to fail to provide accommodations for his guests. Aside from the standpoint of hospitality, cities whose parking provisions are inadequate lose that commercial advantage gained by out-of-town visitors. As an instance, it need only be cited that there were more than 17,000 tourists who passed through Chicago in motor cars last year. There may not be so many this year, if the difficulty of downtown parking becomes a factor.

The Philanthropic Car Owner

MOTORISTS in the state of Illinois find themselves in the anomalous position of advocating a measure which most of them feel will unjustly add to their license fees. The majority of motorists of the state, if given the opportunity, in all probability will vote to double their license fees to pay for improvements which will benefit directly 89 per cent of the population of the state, whether they be car owners or not.

ILLINOIS, which has enjoyed the doubtful distinction of ranking twenty-third among the states in roads, seems about to realize a good roads system, or rather a 4000-mile unit of a proposed 16,000-mile system. Someone has evolved the idea that motorists get all the good of the roads and therefore they should build them. The burden of building this proposed 4000-mile unit is to be saddled on to some 300,000 car owners for the next twenty-five years, while the remaining five and one-half million or more pay nothing yet get their property values enhanced materially and use the roads for hauling their crops to market, for their children to move back and forth from the home to the school.

THE governor of Illinois emphatically states that he will indorse no movement that is to increase the general taxation. He declares that it cannot be done without bankruptcy.

Think of it! Illinois, the richest agricultural state in the union, with practically all of its acres under cultivation, and these acres bringing from \$150 to \$200 an acre, yet land owners cannot afford to pay an average of 2 $\frac{1}{2}$ cents per acre for the next quarter century to realize enough millions to build a highway system!

INSTEAD of spreading the \$80,000,000 bond issue out over the whole 6,000,000 inhabitants of the state, 300,000, who own motor cars, must stand for an increase of 100 per cent in their license fees to meet the payment of these bonds.

IT is not so much the money involved as it is the discrimination against the motorist. True most of the motor organizations have come out for the proposition. It must be admitted that most any motorist will be willing to pay twice his present license fee if he can ride over good hard roads. It will mean more comfort for him, lower maintenance cost on his car and longer life to his car. In spite of this, however, it seems shortsighted policy that places the burden of building a system of highways in Illinois on one-twentieth of the people, when it is conclusively shown that 89 per cent of the people will be directly benefited by the roads when completed.

The Spring Tire Epidemic

THERE is no other time in the year when tires seem to give you more trouble than when you take your car out for the first few times in the spring. On the bright Saturday afternoon and on Sunday you will find the road well lined with cars making changes of tires. It is not all bad spring luck but rather due to a condition that has been in the making for several winter months. A little retrospect will remind you that while you have been driving your car a good deal all winter that you may not have changed a tire since October or perhaps September. It is surprising how long a tire will run in winter without giving trouble. The weather is cool, which helps out very much. But with a hot spring day it is all changed.

IT will prove worth while to have all of your tires looked over before you take the car out for your first Saturday afternoon trip. Take every demountable rim off and get the rust removed. Take all casings off and deflate them. Remove the inner tubes. You may have to add some chalk and clean the casings out. This will prove worth while, but it will not eliminate the spring tire epidemic. The epidemic is largely due to your having kept your car relatively idle during the winter months. The car has stood for a week, two weeks or perhaps longer without even moving. This is hard service on tires. When a tire gets such treatment it will surely give you more or less trouble when the spring arrives.

Should Only the Car Owner Pay?

Looks Now as if Illinois Would Have \$60,000,000

Road Bonds Retired by Doubling

License Fees

ACTIVITIES at Springfield, Ill., last week in good roads affairs should provide one-twentieth of the population of Illinois that owns motor cars much to ponder upon. Governor Lowden in his campaign platform came out strongly for a system of permanent roads in Illinois, but little was said at that time as to where the revenue was to come from to build this system of roads. Now it appears that the initial portion of a proposed 16,000-mile system, in other words, 4000 miles, is to cost \$60,000,000, and if bills now before the Legislature pass, the proposition of issuing this \$60,000,000 in road bonds will be put up to the voters of the state at the next general election in 1918. Further, it is proposed that the motorists of the state furnish the funds to retire these bonds plus interest through a 100 per cent increase in license fees, a bill for this purpose now being before the Legislature, in which it is proposed that a 50 per cent increase become effective Jan. 1, 1918, and another 50 per cent Jan. 1, 1920. It seems a paradox that it should be necessary to put the question of issuing this \$60,000,000 bond issue to a vote of all the people when such a limited number of persons, compared with the total population, are to pay the price.

Lowden Against Further Taxation

When the members of the Illinois Highway Improvement Association and other good roads men went into conference last Tuesday, Governor Lowden made it emphatic that he would support no measure involving an increase in general taxation.

"We could not add a single cent to the general taxation of Illinois under the present constitution without going bankrupt," said the governor. "Taxes are as high as the people can bear. If you are right in your calculations, it seems to me your proposed bond issue is a safe, conservative, business enterprise, which ought to have the consideration of the people of the state, but whether or not it is just to impose the cost on the motorist, it is the only way you have a chance of success."

Perhaps the governor is right, but it will take considerable explanation to give a plausible reason why land owners in Illinois—the richest agricultural state in the union—should not be able to bear a portion of the expense of building a road system which, according to figures and maps shown at the Springfield meeting, benefits 89 per cent of the population.

The Illinois Highway Improvement Association went to the expense of compiling figures, which were published and distributed, showing that a 2½-cent tax per

acre on Illinois land over a period of 25 years would produce the same revenue as a proposed 100 per cent increase in motor car license fees will produce in that time. It may be said that almost by the turn of a hand, these carefully thought out plans and figures for taxation to meet the big bond issue, were consigned to the waste basket by the association officials as soon as they surveyed things at the capital.

It may be true that the motorist gets the greatest benefit from good roads but no one can dispute the fact that a good road enhances the value of adjoining property and it was only reasonable that every one benefited by good roads should do their share toward building and maintaining them.

Illinois roads and mud have become synonymous and people from other states who have had occasion to cross Illinois carry with them a very lasting impression of the inadequacy of Illinois roads. There is no question but that the state needs a system of permanent roads but it is questionable whether or not the motorists should be obliged to pay for a system of highways which statisticians plainly show will be available to 89 per cent of the population and connect all towns and cities of 2000 and upwards.

It is estimated by the secretary of state that there will be 300,000, possibly 350,000, cars in Illinois registered this year and figures have been obtained which leads this office to believe that by 1925 this number will have increased to 600,000. Beyond the 600,000 mark, those who compile the figures do not go, seemingly believing that the saturation point for Illinois will have been reached by that time. Figures have been compiled showing that with the proposed 100 per cent increase in license fees, the volume of money obtained from this source each year, graduating upward until 1925 and then remaining stationary until 1945, will produce \$145,000,000. The bond issue, if it passes, will cover a period of six years at \$10,000,000 a year and during the life of these bonds—the last of them to mature in 1945—interest charges will be \$22,000,000. This will leave \$63,000,000 for maintenance purposes and other road building.

Governor Lowden pointed out to the road men that the bond issue must not outlive the improvements they make if they are to be a success; in other words, roads must remain in good condition at least as long as

it takes to retire the bonds that furnished the funds for their building. The road men back of the proposed issue of bonds are reticent with regard to the material of which the proposed roads are to be built. Certainly at \$15,000 a mile, they must have had something in mind other than macadam roads and it is a well-known fact that to build a brick road with a concrete foundation would require more than this amount per mile, so it may be inferred that this road system is to be of concrete, although some concrete roads have cost as much as \$18,000 to \$20,000. If this system of roads is built, it should be constructed in the best possible way regardless of whether it costs \$15,000 or \$20,000 per mile, for the initial one-fourth must be a monument of endurance and utility, if it is hoped ever to complete the remaining three-fourths.

No one disputes the fact that we need paved roads but the question is: Who is to bear the expense? Just now it looks as if 250,000 to 300,000 people out of the state's population of 6,000,000 are to shoulder all the burden. Looking at it from the standpoint of abstract justice, it is a quaint, old-fashioned idea to be smiled over perhaps rather than grimly argued against, but typical nevertheless of the roundabout way of getting at things we so frequently use in the United States.

Motor Car Not a Luxury

The idea still prevails, it would seem, that the motor vehicle is a luxury pure and simple and the owner thereof a droll spendthrift who is a bit different from ordinary people. As a matter of fact the motor car nowadays is well up in the list of prime necessities.

No doubt there will be much argument as to this bond issue and the good roads men, many of whom are not motorists, will want sympathetic listeners when they explain why the man that maintains a horse-driven vehicle in Illinois is asked for no license fee in return for the better highways over which he drives. Necessarily they will talk to the car owners and it seems likely they will be hard pressed for an explanation as to why the keepers of hotels, road houses, small town garages, each one of which finds its property value increased by opening up road travel, should pay no part of the state money that builds the roads.

It is evident to any one who attended the Springfield meeting last week with an unbiased mind that the question to be decided is not whether it is fair to motorists, but whether it is desirable on the whole to ac-

(Continued on page 17)



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FIG. 10. Same as in Fig. 9, but for the difference in the 500-hPa geopotential height (gpm) between the control and the 1000-hPa wind speed perturbation experiment.



FIG. 12. Same as in Fig. 9, but for the difference in the 500-hPa geopotential height (gpm) between the control and the 1000-hPa wind speed perturbation experiment.



Portrait of a man in a suit and tie.



Portrait of a man in a suit and tie.

The original bill called for an examination of those applying for licenses, but the committee inserted a clause making it retroactive for everyone and effective July 1. As a result the highway commission would have to examine such men as Charles J. Glidden, the world famous tourist; Bill Hilliard, who holds the record for climbing Mount Washington; Louis Ross, who won a lot of races at Florida years ago; Fred Tudor, who has held registration license No. 1 since the first cars were registered fifteen years ago; George Morrill, who drove one of the first cars ever operated in Massachusetts; all the old pioneer dealers; and even Colonel Schier, chairman of the highway commission, a veteran, would have to submit to an examination.

When the bill went to the house for action it was sent to the ways and means committee on a point of order, as it means the expenditure of money. There it will have to be given another hearing. If the bill passed and went into effect July 1, as there is no provision to allow any one time on the test it would mean either a storming of the offices of the highway commission or the holding up of motorists until they were tested. Some might have to wait all summer and not be able to use their cars.

Paying for Roads

(Continued from page 13)

cept the one feasible method offered for the improvement of state roads. If this is made clear at the start, it should go a long way toward clarifying the motor car owners' attempt toward the enterprise.

Viewing the situation from the motorists' standpoint, the increase in fees is an amount not worth quibbling over so far as the money is concerned, especially when consideration is taken of the fact that paved roads mean lower maintenance cost of the car, greater fuel economy and more pleasure in driving. It seems probable that the amount saved from maintenance will be many times over the added cost of licenses.

In Illinois the fees paid in 1916 averaged \$4.94. Assuming that the most popular cars will continue to have the same horsepower on which license fees are based, the average in 1920 under the proposed plan will be around \$10. Arkansas and West Virginia now specify \$10 as a flat rate. The suggestion was made at the Springfield meeting that a \$5 flat rate be charged against cars under 25 hp. and a greatly increased rate be assessed against cars over that horsepower. Secretary of State Emerson showed that this would decrease rather than increase the revenue and drew his conclusions from an average day in his office when licenses were issued to the amount of \$12,000, while \$11,000 of this amount was made up from fees assessed on cars not in excess of \$6.

Army Trucks Reviewed

Government Used First in 1907;
Now Has Twelve Companies of Them

Cost of Operation Per Ton-Mile Is
70 Cents

WASHINGTON, D. C., March 15—In view of the splendid performance of motor trucks on the border during the last few months the annual report of Gen. Henry G. Sharpe, quartermaster general of the army, in which he reviews the activities of the department in motor transportation, is of more than passing interest. General Sharpe says the first motor truck for carrying supplies was procured by the quartermaster's department in June, 1907, since which time the department has made constant progress in developing the motor truck as a means of transportation. Appropriations for this purpose, until recently, have been very limited. The progress of development, however, considering these circumstances, has been very satisfactory.

The quartermaster's department first took up the matter of operating trucks seriously in 1911, and extensive experiments and observations have been made annually since that time. Near the close of the fiscal year of 1916, however, extensive opportunities were afforded for determining the value of motor transportation under severe conditions in Mexico and along the border.

First Specifications Revised

The first specifications of the quartermaster's corps were written in 1913 after extensive correspondence with manufacturers and the Society of Automobile Engineers. These specifications have been revised and brought up to date annually.

During the early part of the fiscal year of 1916 motor transportation was confined to operation of motor trucks in the transportation of supplies between base depots and outlying camps on the Mexican border, in the operation of quartermaster corps depots and at a few posts in the United States and over-sea possessions, where motor transportation could be installed at a saving over animal-drawn transportation.

When instructions were given for the organization of an adequate force of troops to cross the Mexican border, the quartermaster's department was in position to take immediate steps to obtain necessary motor transportation. March 11, 1916, the first call was received from the southern department for two motor truck companies, each consisting of twenty-seven motor trucks of 1½ tons capacity, equipped with necessary personnel for their operation. As soon as the approval of the Secretary of War was received these trucks were purchased and the drivers were hired

at the factories at which the trucks were manufactured.

The department says it has been greatly assisted by representatives of various truck manufacturers in the study of defects and recommendations for improvement in the motor transportation now in operation. By the end of the fiscal year ten motor truck companies, each consisting of twenty-seven motor trucks of 1½-ton capacity, six motor truck companies, each consisting of twenty-eight trucks of 3-ton capacity, and two motor truck companies, each consisting of thirty-three trucks of 3-ton capacity, had been purchased and were in operation along the Mexican border.

At the time the report was written about \$2,175,670 had been expended in motor trucks, equipment and repairs, since which time the amount for motor truck transportation has increased considerably.

The commanding general, southern department, reports that the approximate cost of operation of trucks per ton-mile is 70 cents, which includes all incidentals, such as upkeep of repair shops, etc.

TIPPER JOINS THE AUTOMOBILE

New York, March 16—Harry Tipper, who for nine years has been advertising manager of the Texas Co., has resigned to become manager of *The Automobile* published by the Class Journal Co., in this city. Mr. Tipper is a past president of the Association of National Advertisers, and is now president of the Advertising Club of New York.

COMMERCE INCREASES PRICES

Detroit, March 16—The Commerce Motor Car Co. has increased the prices of its product. The ¾-ton truck is now \$975 for the chassis and \$1,075 for the chassis with any one of the various bodies the company provides. The 1-ton chassis is \$1,240 alone; \$1,275 with an open express body; \$1,350 with an express canopy body; \$1,390 with a stake body.

FLANGED WHEELED DRIVEWAYS

Chicago, March 19—Freight trains composed of motor cars equipped with flanged wheels is the hint which comes from the Cadillac Automobile Co. of Illinois in case of a complete embargo on motor car shipments from Detroit factories.

It is suggested that trains of say six or eight cars could be hitched together and hauled by a "locomotive" car in front. To comply with federal laws, a conductor and brakeman could be carried, the last car serving as a caboose and carrying the prescribed lights and flags.

There is little doubt but what such a train could make enough speed so as to be dispatched easily and not interfere with regular schedules. It is a question what the attitude of the railroads and the Interstate Commerce Commission would be toward such a fantastical step in relieving shipping congestion.





are projecting the rays of light so that little of the light strikes the roadway. I believe this is due to ignorance rather than to carelessness. I have in mind one car owner who purchased fourteen different types of bulbs in order to improve road illumination, when the chief difficulty was that the lamps on his car were so aimed that hardly any of the light fell upon the road. It is only recently that proper attention has been paid to the aiming the headlamp. In the majority of cases headlamps are aimed so that the front glasses are aligned with the rest of the car simply as a matter of appearance. In a number of cases the brackets supporting the lamps will not permit of any adjustment or alteration, such as Figs. 13, 14, 15 and 16. This often results in inefficient road illumination, and is one of the causes of glare production. It is natural for the owner of the car to assume that the lamps have been set to give maximum efficiency, but this is frequently not the case, although some manufacturers do take pains to see that the light projected is kept below the 42 in. limit. Had every car manufacturer followed this practice the glare problem would not have arisen.

Public Should Choose More

Until the public becomes as particular about the design and construction of the head lamps of a car as it is about the type of carburetor or ignition system employed, defective lamps will doubtless continue as standard equipment. This is a matter that can be largely controlled by the motor car buyer if he will insist upon proper construction. The manufacturer of automobile headlamps is only too willing to turn out a lamp of proper design and construction providing, of course, the automobile manufacturer will pay a fair price for it. But as long as the lamp manufacturer is called upon to furnish two headlamps and one tail lamp at a price of less than \$3 per set, we cannot expect a product that will give more than a partial control of the projected light. Headlamps are receiving less attention by engineers than almost any other accessory on the car.

Before considering in general the methods employed in glare reduction we may summarize the details of design that should be given more careful consideration.

Reflectors should be permanently attached to supports by screws.

Socket Adjusting Devices. At present most socket adjusting devices are faulty and must be made more secure. Bulb and rear adjustment should be discarded.

Sockets must be made to closer tolerances and must be located with their axis in the axis of the reflector.

Bulb. The G-16½ bulb should be discarded. The filament of the G-12 bulb being located near the center of and in the axis of the bulb make it far more satisfactory.

Filament Shape. The coil filament is best for general results.

Correct aiming of headlamps is most important.

Filament Area. Only such bulbs as have a filament area complying with the S. A. E. standard should be used.

The problem of the regulation of glare from automobile headlights will never be solved until we determine absolutely upon what basis it is to be attacked. Various laws are based upon entirely different conditions and under these conditions the glare from a headlamp varies. Glare depends not only on the actual candle power and intrinsic brilliancy of the source but also upon the illumination of its environment. This illumination varies from the brilliantly lighted city streets to the dark country roads where the effect of glare will be found at its maximum. I therefore propose that in considering automobile headlamps from the glare standpoint all tests or

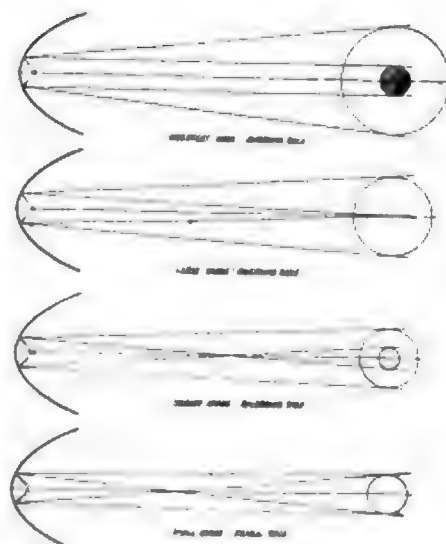


Fig. 6-9—Reading from top to bottom—Different methods of obtaining images from the lens of a lamp

comparisons be made with the headlamp in an environment of absolute darkness. If this form of test be made standard we have attained the simplification by eliminating one confusing variable.

It is regrettable that the numerous methods of conducting tests of devices for reducing glare have resulted in considerable confusion. This is the result of a lack of system in determining the conditions under which the devices are to be tested. Unless some standard form of test is devised we shall continue to read conflicting reports of the same device or method.

I suggest the following methods of test: If the devices are to be tested out strictly from the motorist's point of view then two cars, equipped with the same device and operated under identically the same conditions of bulb, voltage, candle power, and focal position, should be used. The cars should be made to pass each other on an absolutely dark road at various speeds and the contrast between the road illumination of one car and the glare from the lamps of the other car should be the means of determining the efficiency of the methods employed. The speed of the cars is a factor of no little importance. The psychological effects of passing glaring lamps at the rate of 5 and 30 m.p.h. are entirely different.

The confusion incident to the problem of regulating glaring headlights is caused by the attempt to discover a method or means for the absolute elimination of glare without reducing to any appreciable extent the road illumination. This is practically impossible, as the ultimate solution of the problem must result in a compromise between the value of the road illumination and the glaring effect produced by the lamps. For instance, if the diffusion method is adopted there cannot be sufficient illumination on the road without causing disastrous glare effects when near the car. If the deflection method is adopted a certain amount of momentary glare due to the position of the car must be permitted in order to gain the advantage of proper road illumination while at the same time, by limiting the height of the beam of light, preventing glare probably over 85 per cent of the time the headlamps are in use. In suggesting any means for glare reduction which may possibly be adopted in future laws, another thing must be remembered: the effectiveness of the law depends upon the manner in which it can be enforced by the average officer. Therefore simplicity of regulations is much to be desired. The simplest method of determining glare reduction will be most effective

because of the great probability of universal enforcement.

At the same time in seeking simplicity and freedom from highly technical requirements it is unwise to allow regulations to drift into vagueness or ambiguity. The motorist wants to know precisely the limitations of the law. While he has every intention of complying with the law he also wants the best road illumination the law will permit. A source of light of one candle power will cause the effect of glare if of sufficient intrinsic brightness. Therefore the specification "Must not glare or dazzle" is most vague. Until we have a standard unit of glare measurement we must not tolerate such vague requirements.

All devices or methods for glare reduction are based on one of two principles or a combination of both: namely, the reduction of light or the limitation of the light cone.

The methods of light reduction may be classified as follows:

- (a) Dimming the light.
- (b) Change in color of light.
- (c) Diffusing the light.

Dimming the light is accomplished by lowering the voltage of the circuit at the bulb, either by means of a rheostat or series connection, which reduces the candle power of the bulb. This, however, does not alter the light distribution, so that dimming the light to the extent that at the point of maximum illumination there is no effect of glare makes a light useless for road illumination.

There have been attempts to reduce glare by the change in the color of the light, but I have yet to learn of any real success with this method. Any reduction in glare by this method may be caused by the loss of light due to the absorption by the color screen or glass.

Effect of Light Diffusion

Frosted bulb, frosted front glass, diffusing screens or so-called "lenses" diffuse light and the diffusion of light from a source over a much larger area produces a secondary "source" the intrinsic brilliancy of which is less than that of the primary source. In the case of frosted bulbs, for example, the light from the small area of the filament is diffused over the surface of the bulb. The surface of the diffusing screen should be increased with any increase in the candle power of the bulb. The effectiveness of the diffusion method therefore depends upon the candle power of the light source and the area over which the light is diffused. Any variation in the current passing through the filament of the bulb itself changes the effectiveness of this method.

For example when a Ford engine runs at high speed the generator produces a voltage such as to give a light of the greatest intrinsic brilliancy. A screen which will diffuse this light properly will make the light at ordinary speeds of the engine practically useless as a road illuminant. Facts such as these make it apparent why it is unwise, not to say unsafe, to issue a certificate covering a specific type or make of glare reducing device. For example, a screen or so-called "lens" used on a lamp with a 20 candlepower bulb may absorb enough light to reduce the glaring effect sufficiently. But if the owner changes to a bulb of higher candlepower, as he is very apt to do when so much light has been absorbed which should be used to illuminate the road, the lamp at once becomes glaring, although the certificate protects the owner from police interference.

With the diffusion method the light distribution on the road gives a brilliant foreground with no distant illumination. The contrast between this brilliantly lighted foreground and the poorly illuminated background makes night driving at any high, or even moderate speed dangerous and tiresome to the eyes.

A serious objection to the diffusion method is the fact that any reduction of glare at a

distance from the car is added to the effect of glare when near the car. Supporters of this principle have suggested laws the wording of which is such as to overlook this serious defect. This adds to the confusion regarding non-glare legislation.

Limitation of light zone includes means for:

Cutting off light ordinarily outside of zone where light is required.

Tilting of lamps.

Deflection of lights.

Modified reflectors for bulb or headlamp.

Cutting off portions of the light by means of opaque devices or of paint on the bulb, reflector or front glass may reduce the beam candlepower by 50 per cent or more. This of course is rather poor engineering practice. Furthermore, this method is effective only when the bulb is in proper focal adjustment. For example, if the upper half of the front glass is painted then the bulb must be focussed to project a diverging beam. Should vibration cause the bulb to move forward sufficiently the beam will become converging, all road illumination will be lost and the unrestricted light directed upward.

The Cheapest Method

Without doubt the simplest and cheapest effective method of glare reduction is tilting the headlamps. While the light distribution upon the road is limited in certain respects it is far more effective than any of the previous methods discussed. While it is essential that the bulb be focussed properly the percentage of useful light on the road is very high.

Deflection of the light is accomplished by the use of prismatic glass fronts which tend to redirect all or a part of the reflected light. The re-direction of the light in some devices not only keeps it within the zone where glare is not objectionable but also distributes it over a greater width of road. It is an advantage therefore to use a device of this character irrespective of the existence of glare regulations.

Satisfactory results can be obtained by the use of a modified reflector composed of two half paraboloids the axis of the upper one being so inclined as to throw the light toward the ground. In another form the bulb is partly surrounded by a reflector of peculiar form, so arranged as to cut off the direct light and so deflect it that it will be thrown upon the road. Both of these devices are an advantage in that they increase the illumination of the roadway at a point where it is most desirable to have good illumination, and prevent the light from rising above the 42 in. limit when properly applied. Care must be taken, however, to see that the filament is properly focussed.

The Most Effective

The principle of the limitation of light zone has been endorsed by various organizations, including the Society of Automobile Engineers. It is the most effective from the motorist's point of view because it reduces glare with the least loss of useful light and in most applications increases the amount of light upon the roadway. It is the method most readily covered by a simple and easily understood ordinance, an ordinance which is not only effective in accomplishing the desired result, but with which it is easy to comply and which it is correspondingly easy to enforce. When once properly applied any change of voltage or candlepower of bulb, providing proper focus is maintained, has no effect upon its effectiveness. Bulbs of almost any candlepower may be used without altering in any way the light distribution of glare reduction.

Unlike the diffusion method there is less glaring light near the car, and this is an important item where two cars are passing on a narrow road.

One of the greatest factors of safety in

night driving is the projection of light some distance in front of the car. It acts as a warning to others approaching the highway from intersecting roads of the presence of an automobile coming in another direction.

The projection of light at the side of the road when the automobile is making a turn is a warning to others around the turn that a car is approaching. With the diffusion methods this factor of safety is eliminated.

If the percentage of momentary glare from lamps deflected so that the light zone is limited, on a level roadway, to 42 in. from the ground is too great, it may be lessened by limiting the height to 40 or even to 38 in. from the road at a given distance from the car.

ILLUMINATING ENGINEERS MEET

Chicago, March 17—Suggestions for quick and easy means of determining whether or not a motorist's headlamps come within the specifications of the headlight glare ordinance, of any municipality, were the features of a paper entitled "The Headlight Glare Problem," presented by J. R. Cravath, inventor of the Cravath lens as manufactured by the Osgood Co. This paper was presented last night before the Chicago Section of the Illuminating Engineers Society.

Mr. Cravath remarked that ordinarily the enforcement of the ordinance as now on the books of most cities depends on the personal opinion of the police officer on beat and consequently there could be little

or no conformity in its enforcement. In his paper he suggested a test-shed or dark-room in which the lamp may be tested by simply running the car into the test-shed and comparing its light at definite points with that of a standard light by a simplified method of photometry. Mr. Cravath's paper is reproduced in part below:

The dangers and annoyances due to interference with vision caused by the glare from powerful automobile and locomotive headlights is now generally recognized wherever such headlights are in use. The problem is how to reduce or eliminate this glare without so much reducing the useful illumination given by the headlight to the driver as to cause another equally dangerous and annoying condition.

Naturally the first question is, What causes and constitutes glare? The 1915 Committee on Glare of the Illuminating Engineering Society, under the chairmanship of Dr. P. G. Nutting, agreed upon certain definitions of glare which in effect were that glare is a bright light within the field of vision of such character that it causes (a) eye fatigue, (b) annoyance, (c) interference with vision or reduction of ability to see clearly, sometimes called "blinding effect."

Where Chief Interest Lies

As far as the automobile headlight problem is concerned, we are chiefly interested in glare insofar as it causes the last of these effects, that is, interference with seeing clearly, although the other two are worth considering.

Can glare be completely eliminated in connection with the headlight problem, or must we be satisfied with some kind of a compromise? In a strict technical sense there is some inconvenience and interference with seeing if a light of very low candle-power is almost in line with objects we are attempting to see, whenever the surroundings are as dark as they commonly are at night on roads where headlights are needed. It is not, therefore, reasonable to suppose that we can absolutely eliminate glare in its technical sense, and the problem is, therefore, to reduce it to a reasonable minimum.

On a very well lighted street there is little need of a headlight as far as the driver is concerned, and on such streets its principal function is to act as warning to other drivers and pedestrians. Experience both as pedestrian and driver has convinced me that it is a mistake to depend altogether on very low power side lights as a warning of the approach of a vehicle.

Since it is upon country roads that the driver needs most light from his headlight, and since it is amid these dark surroundings that a given candle power of light would cause the most pronounced glare, the problem on the well lighted streets may be said to take care of itself if we can reach a satisfactory solution for poorly lighted streets and roads.

Glare Cause Simple

Although there are some problems connected with glare which have been very incompletely studied, there should be no mystery or confusion about what causes the glare in the case of headlights of the common parabolic type. As far as I know all competent authorities who have studied the subject are agreed that in practice headlight glare is caused simply and solely by the high candlepower of the beam of light entering the eye. Whether the effect on the eye varies directly as the candlepower or as the square root of the candlepower as stated by some authorities, is of little practical interest. The big practical consideration that outweighs all others is that with automobile headlights we are usually dealing with a beam of light of 1,000 to 50,000 candle power, and the eye cannot be subjected to such a

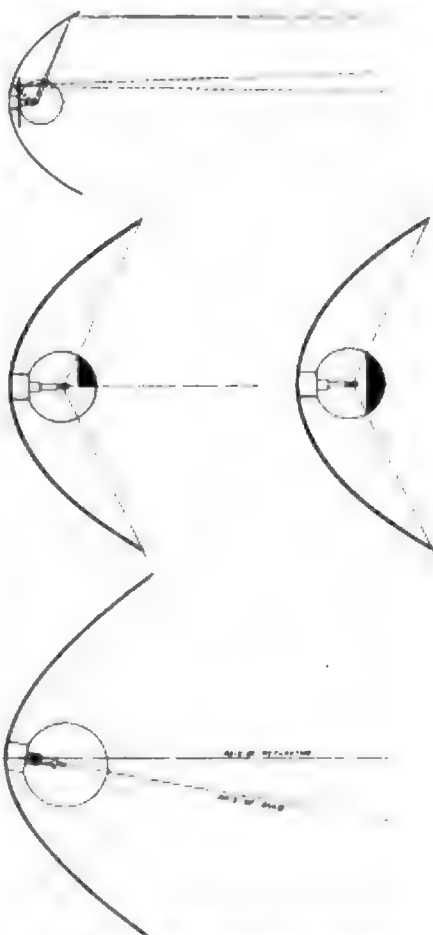


Fig. 10—top—Adjustment that gives one image of maximum intensity. Fig. 11—center—Painting the bulb to eliminate useless direct rays. Fig. 12—bottom—Radial displacement of filament



It reduces the distant glare considerably, increases the glare in the eyes of a driver who is close up and about to pass. At 100 ft. the glare with ground glass is quite likely to be worse than with clear glass unless the lamp is very much out of focus with the clear glass.

The diffusion and scattering of light rays by ground glass is due to an infinite number of very small irregularities of the glass surface. Some other types of diffusing lenses make use of much greater irregularities and do not scatter the beam quite so much. Of these common Florentine office partition glass is an example which is very similar in its action to the Warner and Prismolite lenses. There is, of course, more glare with these than with ground glass.

Methods of Beam Control

Methods of reducing glare by keeping the level of the concentrated beam below the eye level, as already explained, seem to the writer, after considerable study, to be unquestionably the proper lines of attacking the problem. This method is not without its difficulties, as will be discussed later in connection with accuracy of manufacture.

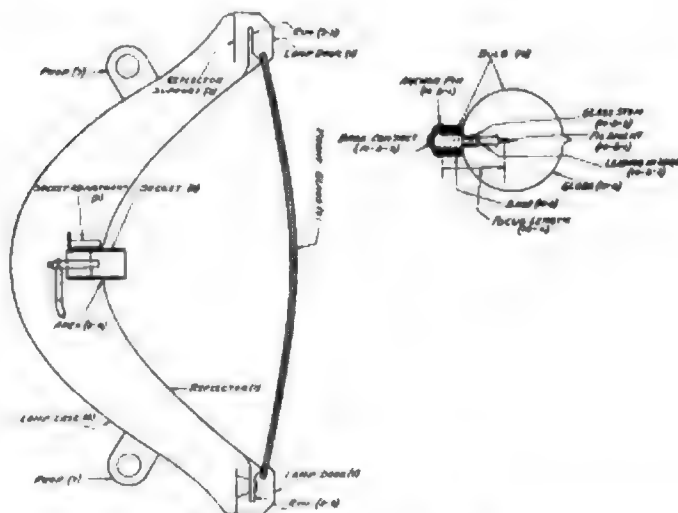
While these beam control methods differ among themselves in merit, they are all, in my opinion, superior to diffusion or dimming because of the greater distance ahead at which objects can be seen.

When the writer first considered this subject several years ago it then seemed that the accuracy of beam control required to make this method worth anything would call for an almost unattainable concentration of filaments and accuracy of manufacture of the various parts making up the headlight. Present practice, however, has put this method within easy reach, although it is not quite as easy in application at the present time as it probably will be within a few years when manufacturers and garage men have become better educated as to standards of accuracy required.

In considering this method of glare elimination the first question that is likely to occur to the technical man is that which occurred to the writer when he first began the study of the subject. Why not put the lamp at the focus of the reflector so as to get a concentrated beam and then tilt the headlight slightly downward so that the upper edge of the beam is either level or slightly inclined downward? I believe numerous technical men have advocated this. The practical difficulty which has been overlooked in this connection is that a beam so concentrated is too narrow to satisfactorily cover the road for driving purposes. The maximum concentration usually attainable with an automobile headlight is a divergence of about 4.5 deg. corresponding to a beam about 8 ft. 4 in. in diameter at 100 ft. distance. This is surrounded by a less bright beam of large diameter but not a source of bad glare. There are few roads so good and straight that a narrow beam of this kind is satisfactory. Curves and side ditches are fully as much to be considered as possible obstructions or holes in a straight-away road.

Broadening Beam

The next question is: why not broaden out the beam by putting the lamp out of focus and tilt the headlight a little more so as to keep the top of the beam below the glare level? To do this would require much more tilting than is now common, but this is not an objection if the method is otherwise satisfactory. When the beam is widened enough to illuminate a sufficient width of road it is, of course, increased proportionately in height and the great amount of tilting necessary to bring the top edge of the beam below the glare level brings the lower edge of the beam up close to the car. The result is that altogether too much of the



seemed that the best result should be obtained with a lens which would accomplish the following three things: (1) light deflection below the horizontal; (2) flatten from a round to a long oval or rectangular form; (3) widening.

The lens which accomplishes these results is designed for use with the lamp slightly back of the focal point. The back face of the lens consists of a set of horizontal prisms of increasing angularity and deflecting power from bottom to top. These prisms are calculated to refract the upwardly diverging rays from the upper half of the reflector sufficiently to merge them into the downwardly diverging rays from the bottom half. This accomplishes the desired flattening. To accomplish the widening the front of the lens has concave cylindrical surfaces, which, to obviate too great glass thickness at the edges, are made in two stages. The result is a beam, which, when projected against a vertical surface, is about twice as wide as high. To a certain extent it is fool-proof as regards improper focusing, because if the lamp is placed ahead of the proper focus a very high narrow beam results, which should be so unsatisfactory to the driver that if he pays any attention whatever to focusing he will hasten to correct the trouble.

With all devices of this class where accurate beam control is essential, proper focusing is, of course, important, and too much emphasis cannot be laid upon the importance of educating users and garage service men to proper headlight focusing. The majority of automobile owners do not know that there is such a thing as focusing a headlight. Education on this is badly needed all along the line.

Width of Beam

The width of beam with this lens is about 21 to 23 ft. at 100 ft. distance. This is probably wider than many would consider necessary from theoretical consideration of the subject and in fact is wider than the writer first thought was best when making this design, but later developments and practical trial made the width mentioned seem best for all-around average conditions. With the reflector axis horizontal the brightest spot in the beam is $3\frac{1}{2}$ deg. below horizontal. In practice in the majority of cases there is a still further downward deflection due to the fact that the majority of headlamps are tilted slightly downward and this was recognized in the design of the lens.

Measurements made by Profs. Freeman and Snow, of Armour Institute of Technology, on a beam from this lens as compared to a circular beam of the same width from the same lamp and reflector equipment with clear glass shows that the average apparent candle power of the beam below the axis of the reflector was 2,110 for the Cravath lens as against 1,210 for the plain glass. This increase of average beam intensity of about 74 per cent is, of course, due to deflection of the light flux of the upper part of the beam into the lower part. The beam intensity was found to be about nine times that with ground glass.

Accuracy in Manufacture

If there is to be accuracy in the control of the beam of light it is essential that the headlight be properly pointed; that is, that the axis of the reflector shall point somewhere near right both vertically and horizontally. The lamp filament must be centered accurately with reference to the socket, and the socket with reference to the reflector. As far as lamp manufacture is concerned, efforts are now being made by the standards committee of the Society of Automotive Engineers to correct variations in filament position. There is also talk of so standardizing lamps and reflectors that focusing will be unnecessary. In other words,

having the lamp filament at a fixed focal position. For reasons already given, this would give a beam too narrow for good driving and precludes the possibility of some of the other methods described being used to eliminate glare. The movement to secure accurate centering of filaments in reflectors is, of course, very desirable. Accuracy of reflector manufacture is also desirable. These points are up to the lamp and reflector manufacturers. A third point which is still more important to judge from the actual conditions existing today is up to the automobile manufacturer. This is in the pointing of the headlamp. During my studies on lens design I had electric headlights on one hundred automobiles measured as they stood on the level streets at various places in Chicago to determine the actual conditions prevailing as to the pointing of headlights. Measurements were taken by holding a plumb line in front of the headlight face and noting how much the headlight was out of plumb in its diameter. The results were as follows:

MOTOR CARS

Both headlights tilted down.....	67
One headlight down and one up or plumb	28
Both headlights pointed up.....	5
Total	100

LAMPS

	Number	Percent
Tilted down.....	162	81
Tilted up.....	28	14
Plumb	10	5

The cars comprised a large number of makes just as they came along the street. There was no particular uniformity among the cars of any one make. The results in general indicate that manufacturers aim to have headlamps pointed slightly downward in most cases. There is considerable chance about whether it is actually done or not. The lamps varied all the way from perfectly plumb to 1 in. out of plumb, both up and down. A large number were from $\frac{1}{4}$ to $\frac{3}{4}$ in. out of plumb. The same irregular conditions doubtlessly exist as to the horizontal pointing and it is the exception rather than the rule to see a car whose headlights properly cover the road.

It is useless to expect that automobile frames upon which headlight arms and brackets are mounted can be assembled accurately enough to result in properly pointed lamps. Considering all of the possible inaccuracies in the assembling of an automobile frame its headlight supports and the headlights themselves it would seem that about the only way to secure proper pointing, which would be cheap enough to be workable except on very high priced cars, would be to depend on final inspection and adjustment after the car is completely assembled and to provide some cheap and easy way of adjustment. On cars where headlights are supported on arms of sufficient length to permit bending a simple bending probably offers the best solution. On cars where the headlights are mounted on short lugs or built into the guard the problem is not so easy, but these are mostly higher priced cars on which more time can be spent. Headlight adjustments of this kind must be made in the dark or at least not in broad daylight and must be made with the actual beam of light from the lamp rather than from any external measurements which do not always take into account the internal assembly of the headlight. However, external measurements alone would improve the present conditions considerably, as can be judged from the figures given.

Legislation

Headlight laws cannot be said to be in satisfactory shape either as to their enact-

cations or means of enforcement. They are, however, generally better than nothing, because they usually make it possible to arrest and fine the worst offenders. In this connection the writer has the following suggestions to offer.

The fundamental difficulty with legislation so far has been that it does not define what constitutes the dangerous or blinding or dazzling glare, which it attempts to prohibit. It is left to the judgment of the enforcers of the law to define this. While all would agree as to very bad glare without measurement, there should be some definite specifications, susceptible of exact test, to apply to cases where the offhand judgment of different people would vary; and it will vary over a large range.

There is a simple way to define the amount of glare permissible and that is in the maximum candle power of any beam that can enter the eye above a glare level of 42 in. As to the candlepower limit to be set tests should be conducted to determine this before writing it in the laws or regulations.

These tests should be made with both pedestrians and drivers on a dark street, to determine how much candlepower in the direction of the eyes can be permitted. The details and methods used in such tests should be carefully worked out by experts.

Once such a candlepower limit is set, the question of enforcement comes up just as it has come up with existing laws.

A law which simply provides for the approval of a certain device without regard to how it can be misused does not fully answer the purpose. As already shown, excellent devices can be mis-applied. Judgment should be based on results.

Following out this idea a headlight glare law would specify, for example, that there shall be no glare above a 42-in. level, 50 or more ft. ahead of the car with the car on a level road, and it would define the candlepower of the beam that is to be considered glaring.

Ease of Enforcement

Such a law could be more easily enforced than a speed law. An arrest by the policeman would necessarily have to be on suspicion, subject to a simple test with photometer when the offender arrives at a designated test station under charge of the court having jurisdiction over such cases. If the car does not carry devices which diffuse the offending beam, the policeman can quickly check up his suspicions before making the arrest by walking back 50 ft. and seeing where the upper edge of the beam strikes his body. If the road is level and a well defined beam strikes above 42 in. he can be reasonably sure he is justified in making the arrest. While a driver might manipulate things before arriving at the test station so as to change conditions he would not be likely to repeat his offense because of the inconvenience of such an arrest.

The idea of a test station may call up alarming visions of elaborate apparatus and a corps of expensive experts, but as a matter of fact such a test station could be devised that could be worked very simply, without experts in photometry, by the judge himself or any officer of the court, provided it were properly designed and installed and occasionally supervised by experts. This test station should also be available for any automobile owner to determine whether his equipment conforms with the law. An easily available and quick test of this kind should help materially as a preventative and educational measure.

Discussion of Cravath's Paper

The need for standardized regulations for headlight glare restriction was emphasized by Mr. Cravath in the summing up

of his paper in which he stated that if one were to comply with the ordinances of the different states and municipalities on a transcontinental trip he would have to change his headlights eighteen times between New York and San Francisco.

Another feature of the situation which was brought out by the chairman in his introduction of the discussion, was the effect of the color of clothes on the visibility of pedestrians and also the fact that none of the headlight regulations or suggested standard regulations, such as those of the Society of Automotive Engineers, when specifying the distance at which an object must be rendered visible by a headlight make reference to color. On this feature, H. A. Johnston of the Chicago Electric Railways stated that the headlight tests of that concern proved that a white man in light clothes became visible twice as far away as did a negro in dark clothes.

Engineer Flanagan of the Board Vehicle Headlight Inspection of the city of Chicago made the point that there had been 7000 arrests in Chicago for glaring headlights during the three years the ordinance

has been in force. He stated that the board had made 195 inspections of anti-glare devices and had approved approximately seventy-five of these devices.

One of the features of Chicago's anti-glare law which worked a hardship on motorists and tended to cause them to disregard the law was brought out by Darwin S. Hatch of Motor Age in the statement that many of the violations could be traced to improper illumination or absence of illumination of the city streets and parks, by the city of Chicago and the park board.

He contended that inasmuch as the idea of the board of inspection was simply to assure that sufficient light was provided to act as a marker for the vehicle, without reference to its value as a road illuminator, providing there was no suggestion of glare, the board had passed devices under restrictions which prevented their supplying sufficient road illumination on dark streets. If the motorist use these streets, he would have to select on his own information a device which not only passed the board but also provide him enough illumination for driving right.

board of directors: W. C. Durant W. C. Sills, Nathan Hofheimer, L. G. Kaufman, E. R. Campbell, R. H. Higgins, A. H. Goss, H. M. Barksdale, E. O. Wood, and J. T. Smith.

DANES PROHIBIT CARS ON STREETS

Copenhagen, Denmark, March 14—The Danish government has prohibited temporarily the use of passenger cars on the streets. The gasoline and tire shortage has become serious and the government has taken this means to alleviate the situation. There are more than 30,000 cars in this country, so that with the present strict censorship by Great Britain on all shipments of cars, gasoline and tires, the scarcity of these motor necessities is apparent. Gasoline is selling at four to six times the price current in the United States. Few tires reach this country.

MOLINE PLOW CO. EXPANDS

Moline, Ill., March 16—When the addition to the main building of the Moline Plow Co. tractor plant is completed, about April 1, work will start immediately on a new building for storing stock. That portion of the plant originally designed as a stock room is being utilized for machinery. The present plant is capable of turning out from eighteen to twenty tractors each day. The plant has reached the maximum of construction since the first of the year, and orders can not be filled as rapidly as received. The first tractor was turned out July 1, 1916, and plans were made to turn out from six to eight a day, but the production soon was increased.

VELIE PRODUCTION INCREASES

Moline, Ill., March 17—The Velie Motor Vehicle Co. is preparing to double its output for 1917 and plans to produce more than 10,000 cars. Already 40 cars are being produced daily. This increased output has been made possible by the installation of a progressive assembly system and requires but few extra men. The frames are carried from overhead through the center of the assembly room. At one stage the engines are swung into place; at another, the rear axle; and so on until all parts of the chassis are assembled. To care for the increased production, the wagon works are fast being absorbed, and it is predicted that by the end of the year they will have been entirely crowded out by the motor car plant.

FINAL BANKRUPTCY DIVIDENDS

Detroit, March 16—Final payment dividends in the case of the bankrupt Briggs-Detroit Co. were mailed to creditors this week. The distribution amounts to \$3,700, which is 17/100 of 1 per cent of the total claims. The total distribution amounts to \$45,000 to preferred creditors and \$81,000 to general creditors. Total claims against the company when it went into bankruptcy, June 28, 1916, were \$485,000. Total realized assets were \$143,432.

Thirty-Five Models Are Higher Now Increases During Last Two Weeks Prophecy Advances by Other Makers

NEW YORK, March 20—Special telegram—The prices of motor cars quietly increased in the last two weeks by advances ranging from \$25 to almost \$1,000. Nearly twenty-five passenger car and truck prices have been raised to date, but it was expected that there would be a large readjustment to take care of the big increase in the cost of materials. The following increases have gone into effect:

CAR	MODEL	OLD PRICE	NEW PRICE
Allen	5 pas.	\$ 850	\$ 895
Allen	7 pas.	850	895
Austin	7 pas.	3,750	4,000
Crow Elk	2 pas.	825	845
Chalmers	2 pas.	1,210	1,250
Detroit	2 pas.	1,195	1,250
Detroit	5 pas.	1,195	1,250
Detroit	Coupe	1,375	1,525
Detroit	Detach. top	1,398	1,550
Metz	2 pas.	545	600
Metz	5 pas.	545	600
Franklin	2 pas.	1,800	1,900
Franklin	5 pas.	1,850	1,900
Franklin	Coupe	2,450	2,750
Franklin	Sedan	2,750	2,850
Locomobile	2 pas.	4,750	5,150
Locomobile	5 pas.	4,600	5,000
Locomobile	7 pas.	4,600	5,000
Locomobile	Limou.	5,600	6,200
Locomo	M-7 2 pas.	5,400	6,050
Locomo	M-7 5 pas.	5,400	5,950
Locomo	M-7 Limou.	6,500	7,200
Paterson	2 pas.	1,095	1,195
Paterson	5 pas.	1,095	1,165
Paterson	7 pas.	1,095	1,195
Peerless	2 pas.	1,980	2,090
Peerless	5 pas.	1,980	2,090
Peerless	Coupe	2,700	2,750
Peerless	Sedan	2,840	2,890
Peerless	Limou.	3,350	3,590
Singer	2 pas.	3,500	3,800
Singer	5 pas.	3,500	3,800
Singer	7 pas.	3,500	3,800
Singer	Limou.	4,600	4,750
Stutz	2 pas.	2,275	2,375

WILL STUDY JAPANESE MOTORING

Vancouver, B. C., March 16—Hi Sibley, special correspondent for MOTOR AGE,

sailed yesterday on the steamer Empress of Asia for Japan, where he will study motoring and motor trade conditions in the islands. Mr. Sibley's special articles on motor vehicles on the European battle fronts and with Pershing's punitive column in pursuit of Villa in Mexico, as special correspondent for MOTOR AGE, has made his work known to readers of this publication.

U. S. RUBBER TAKES PLANT

Bristol, R. I., March 16—The plant of the National India Rubber Co. has been taken over by the United States Rubber Co. The assessed value of the land and buildings is \$550,000. The plant employs 3500 operatives.

CHEVROLET DECLARES DIVIDEND

New York, March 20—Special telegram—The Chevrolet motor yesterday declared an initial dividend of 3 per cent, payable May 1 to stock of record April 20. President W. C. Durant predicted 1917 business in excess of \$80,000,000 as compared with \$33,000,000 in 1916. From Jan. 1 to March 10 this year the company shipped 21,875 cars against 10,068 in same period a year ago. The company has been cancelling for the last five months from 5000 to 12,000 orders at end of each month, which it was unable to take care of. Sales of cars in 1916 were 69,683, of which 50,048 were from sub companies and 19,635 were from affiliated companies. Following is the

THE JOURNAL OF POLITICAL ECONOMY

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where weekly meetings are held and applications received. Effort is made to detail drivers to routes of financial opportunity, and service is regulated.

The organization has 270 members. Summer traffic is expected to bring 600. Last year the operators paid out between \$50,000 and \$75,000 for repairs, between \$300,000 and \$400,000 for gasoline and between \$50,000 and \$75,000 for new cars. The average life of the jitney car is one year. Each driver uses 7 gal. of petrol each day and works 12 hrs. daily. From fifty to seventy-five mechanics are employed constantly to make repairs. From three to four sets of tires are used yearly.

DISBROW MOTORS INCORPORATES

Cleveland, Ohio, March 17—The Disbrow Motors Corp. has been chartered under the laws of New York and Ohio with a capital of \$300,000, fully paid in. Louis Disbrow is president. J. J. Curl is secretary and treasurer.

STEWART-WARNER PRODUCTS

Chicago, March 19—The Stewart-Warner Speedometer Corp., Chicago, is expected to add two more products to its line of motor car equipment soon. They will be known as the Stewart V-Ray searchlight and the Stewart Autoguard.

RUBBER OUTPUT BIG

Chicago, March 16 — Preliminary estimates of the world's rubber production in 1916 are that the output exceeded any previous year and that the increase was due entirely to the growth of the plantation rubber industry. Supplies of rubber from Brazil and other rubber countries show a reduction from a comparatively recent date. The total rubber output last year is given at 198,000 tons, compared with 153,555 tons in 1915.

STEGEMAN INCREASES CAPITAL

Milwaukee, Wis., March 19—The Stegeman Motor Car Co., Milwaukee, Wis., manufacturer of motor trucks, has increased its capital stock from \$100,000 to \$200,000. At the same time announcement is made that Joseph C. Millmann, secretary and treasurer of the company since its organization, has retired. His interest has been taken over by Oscar Stegeman, president and general manager, and L. G. Schertl, the latter taking Mr. Millmann's positions. Mr. Schertl also will be director of sales. Frank H. Parker continues as vice president. Frederick Gettelman has become a member of the board of directors. The Stegeman company on March 15 moved into its new office and engineering building and within thirty days expects to occupy extensions to the machine and assembling shops, which will make it possible to handle between seventy-five and eighty trucks at one time.

Stagnates Truck Trade

Pending Legislation in California Stops Dealers' Business to Await Results

Distributors Report Loss of Sales and Threatened Bankruptcy

LOS ANGELES, Cal., March 15—Motor truck dealers here admit their business is practically stagnated as the result of pending legislation directed against motor-propelled commercial vehicles.

One of the largest distributors in the state to-day acknowledged the loss of a sale of five 5½-ton trucks, due wholly to unsettled conditions. He says he has at least twenty other prospective buyers who will not conclude their deals until something definite is done by the legislature. Another dealer, whose average business has been about four sales a week, said he had not sold a truck this month. A third said the proposed laws would compel him to quit business. All are exclusive truck representatives.

\$25 a Bus Seat

It is provided in one bill that each passenger-carrying bus must pay a license of \$25 a seat. Many of these buses with a capacity of twenty-four passengers are in service between Los Angeles and suburban towns. That would mean a tax of \$600 for each vehicle. In addition they must pay 4½ per cent of the earnings to the state railway commission, state and county tax on equipment, the state operator's license and a weight tax, or six taxes in all, which approximately would amount to \$1,250 a year.

Truck capacity is to be limited to 5 tons. There are many larger than this in use in the state, and instead of considering the purchase of additional equipment large operators are now thinking about how they can dispose of what they have. On a 5-ton truck the bill would levy a tax of \$350. In addition there would be a state license, weight tax and, in case the truck is engaged in general hauling, a city tax and the usual state and county property tax. This would amount to between \$650 and \$700 in all.

It is estimated that the oil companies operating in California are using 300 trucks equipped with tank bodies. When loaded, the truck, tank and contents weigh approximately 14 tons. Each outfit represents an expenditure of approximately \$4,000. None of these trucks can be used as now equipped if the bill becomes a law.

AN INVESTMENT THAT PAID

Elizabethtown, Ky., March 16—Hardin County considers that it has made \$500,000 with a \$50,000 investment since the construction of the Dixie highway through the county. Of this gain at least \$21,000 is

attributed to money left by the tourist. A count was kept of cars bearing licenses of other states in the seven months of the 1916 touring season, and 21,000 such followed the highway through the county. Though each car averaged four passengers, making a total of 84,000 tourists, the estimate of the money left in the county has been placed as low as 25 cents each.

Each Hardin County farm along the highway has increased in value \$10 an acre. About 240 farms have 2000-ft. frontages on the highway on either side. No consideration is taken of the saving to the farmers in transportation. Two years ago a motor trip from Elizabethtown to Louisville took all day for the 45 miles. That was before the present highway. Now one can motor into Louisville and attend the theater or concert and return the same night.

BRISCOE EIGHT HIGHER

Jackson, Mich., March 16—The price of the Briscoe eight-cylinder car will be advanced from \$985 to \$1,025 March 25.

HOLLAND PLACES CAR EMBARGO

New York, March 19—Special telegram—Holland has placed an embargo on motor cars. The Government requisitions all shipping space for food stuffs and no space is allowed for motor cars.

DEALER TO HANDLE AIRPLANES?

Chicago, March 17—The possibility of the sale of airplanes and airplane parts by a Chicago motor car dealer is suggested in the incorporation this week of Thomas J. Hay, Inc., with Thomas J. Hay as president, George C. Norwood as vice-president, J. H. Quinlan as secretary and George F. Friese as treasurer. Tom Hay is the Chandler dealer in Chicago, and the articles of the new incorporation include provision for the aviation manufacturer market.

JORDAN ANNOUNCES INCREASE

Cleveland, Ohio, March 15—The Jordan Motor Car Co., this city, has announced an increase in prices, effective April 1. The seven-passenger car and the sporting roadster are listed at \$1,795, while the four-passenger sport model with wire wheels, regular equipment, will sell for \$1,495.

DAVIS TO 'RAISE PRICES

New York, March 16—The Davis Motor Car Co., Richmond, Ind., will raise its prices \$100 April 1 on its models H, I, J, and J. L. with the exception of the Springfield Sedan which remains at its present price. The H and I models are at present quoted as follows: two-passenger, five-passenger and seven-passenger, \$1,195; coupe, \$1,595; sedan, \$1,795; and detachable top, \$1,995. The J model is listed at \$1,495 for both the five and seven-passenger types.

Children's Book Museum

Book Treasure Hunt





Figure 1. (a) The dark surface of the book cover.

Figure 2. (b) The lighter surface of the book cover.







Figure 1.1: A heavily blurred and pixelated image of a person's face, illustrating the concept of low resolution or poor image quality.

Figure 1.2: A heavily blurred and pixelated image of a person's face, illustrating the concept of low resolution or poor image quality.

Figure 1.3: A heavily blurred and pixelated image of a person's face, illustrating the concept of low resolution or poor image quality.

Figure 1.4: A heavily blurred and pixelated image of a person's face, illustrating the concept of low resolution or poor image quality.



Figure 1.5: A heavily blurred and pixelated image of a person's face, illustrating the concept of low resolution or poor image quality.





The first of these is the fact that the majority of the population of the world is now living in urban areas. This has led to a rapid increase in the demand for housing, and a corresponding increase in the price of land. The second factor is the increasing demand for energy, particularly in the form of oil and gas. This has led to a rapid increase in the price of these commodities, and a corresponding increase in the price of land. The third factor is the increasing demand for food, particularly in the form of meat and dairy products. This has led to a rapid increase in the price of these commodities, and a corresponding increase in the price of land.

The fourth factor is the increasing demand for water, particularly in the form of drinking water. This has led to a rapid increase in the price of this commodity, and a corresponding increase in the price of land. The fifth factor is the increasing demand for electricity, particularly in the form of power for industry and commerce. This has led to a rapid increase in the price of this commodity, and a corresponding increase in the price of land.

The sixth factor is the increasing demand for transportation, particularly in the form of cars and trucks. This has led to a rapid increase in the price of these commodities, and a corresponding increase in the price of land. The seventh factor is the increasing demand for communication, particularly in the form of telephones and telegrams. This has led to a rapid increase in the price of these commodities, and a corresponding increase in the price of land. The eighth factor is the increasing demand for education, particularly in the form of schools and universities. This has led to a rapid increase in the price of these commodities, and a corresponding increase in the price of land.

The ninth factor is the increasing demand for health care, particularly in the form of hospitals and clinics. This has led to a rapid increase in the price of these commodities, and a corresponding increase in the price of land. The tenth factor is the increasing demand for entertainment, particularly in the form of movies and television. This has led to a rapid increase in the price of these commodities, and a corresponding increase in the price of land. The eleventh factor is the increasing demand for recreation, particularly in the form of parks and resorts. This has led to a rapid increase in the price of these commodities, and a corresponding increase in the price of land. The twelfth factor is the increasing demand for security, particularly in the form of police and military forces. This has led to a rapid increase in the price of these commodities, and a corresponding increase in the price of land.



The thirteenth factor is the increasing demand for information, particularly in the form of books and newspapers. This has led to a rapid increase in the price of these commodities, and a corresponding increase in the price of land. The fourteenth factor is the increasing demand for travel, particularly in the form of ships and airplanes. This has led to a rapid increase in the price of these commodities, and a corresponding increase in the price of land. The fifteenth factor is the increasing demand for defense, particularly in the form of weapons and military equipment. This has led to a rapid increase in the price of these commodities, and a corresponding increase in the price of land.

The sixteenth factor is the increasing demand for science and technology, particularly in the form of research and development. This has led to a rapid increase in the price of these commodities, and a corresponding increase in the price of land. The seventeenth factor is the increasing demand for art and culture, particularly in the form of museums and galleries. This has led to a rapid increase in the price of these commodities, and a corresponding increase in the price of land. The eighteenth factor is the increasing demand for religion, particularly in the form of churches and mosques. This has led to a rapid increase in the price of these commodities, and a corresponding increase in the price of land.

The nineteenth factor is the increasing demand for sports, particularly in the form of stadiums and arenas. This has led to a rapid increase in the price of these commodities, and a corresponding increase in the price of land. The twentieth factor is the increasing demand for food and drink, particularly in the form of restaurants and bars. This has led to a rapid increase in the price of these commodities, and a corresponding increase in the price of land. The twenty-first factor is the increasing demand for clothing and fashion, particularly in the form of stores and boutiques. This has led to a rapid increase in the price of these commodities, and a corresponding increase in the price of land.

The twenty-second factor is the increasing demand for housing, particularly in the form of houses and apartments. This has led to a rapid increase in the price of these commodities, and a corresponding increase in the price of land. The twenty-third factor is the increasing demand for transportation, particularly in the form of cars and trucks. This has led to a rapid increase in the price of these commodities, and a corresponding increase in the price of land. The twenty-fourth factor is the increasing demand for communication, particularly in the form of telephones and telegrams. This has led to a rapid increase in the price of these commodities, and a corresponding increase in the price of land.

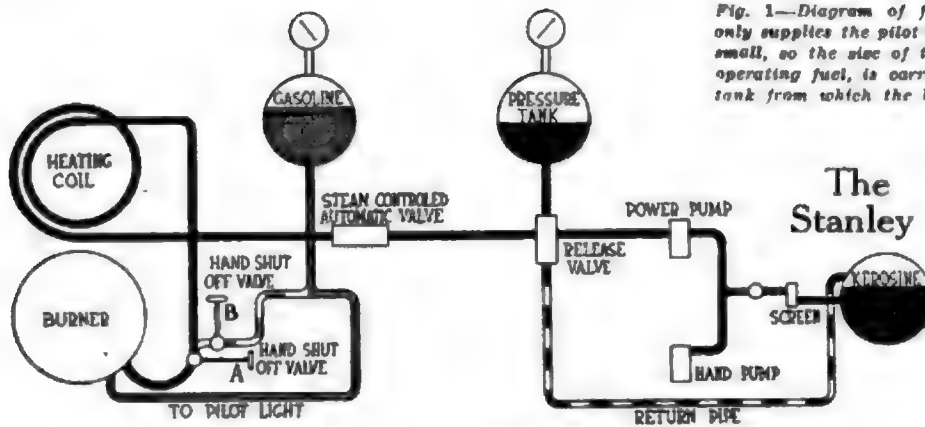
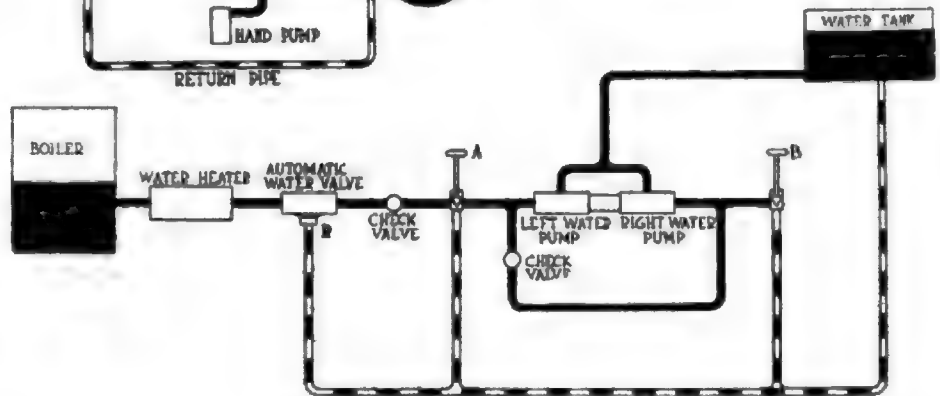


Fig. 1—Diagram of fuel system of Stanley steam car. The gasoline only supplies the pilot light, which never goes out, and the consumption is small, so the size of the tank is exaggerated in the cut. Kerosene, the operating fuel, is carried in the rear tank and pumped to the pressure tank from which the burner takes its supply. When the steam pressure reaches a predetermined point the supply of fuel is cut off and the kerosene pumped is allowed to go back to the main tank. The heavy black line in the cut indicates the kerosene supply, the broken black line the return line for surplus, and the gray lining gasoline.

Fig. 2—Diagram of water system of Stanley steam car. Water is pumped toward the boiler by one or two pumps, according to the positions of the hand valves A and B. After reaching a proper level in the boiler the release valve R is opened and the water then goes back to the main tank, whether the pumps are both working or not. In practice the left pump always is in use subject to the automatic control, and the right pump is hardly ever called into service.



The Steam Car Today

HAD steam cars received the impetus of quantity production which has blessed the gasoline car business, the public in general would be more informed as to the really remarkable developments in this field. The gasoline car of 7 or 8 years ago was truly a crude contrivance, and because of its tremendous growth the public has become familiarized with the improvements and knows that it is a far superior proposition. Although it is a less known fact it is nevertheless true that the steam car has developed on an equal plane with the gasoline car.

Here is what one gets in the present-day steamers: Start and stop on the throttle; a pulling power at low speeds that most gasoline cars cannot approach; and it will accelerate at a degree possible only in big multiple-cylinder gasoline cars and probably will excel most of them; it will climb hills at a high rate of speed or at a crawl; it will turn over the rear wheels on concrete with the front of the car against a wall; it is quiet, practically vibrationless, free from carbon trouble, and far more economical in fuel than any gasoline car which will give the same performance. There are no gears to shift.

Another thing which seems to be contrary to general opinion. The steam car is not a complicated and delicate piece of mechanism, requiring constant watching and an everlasting amount of attention. That was the steamer of 5 years ago—it

(Continued on page 39)

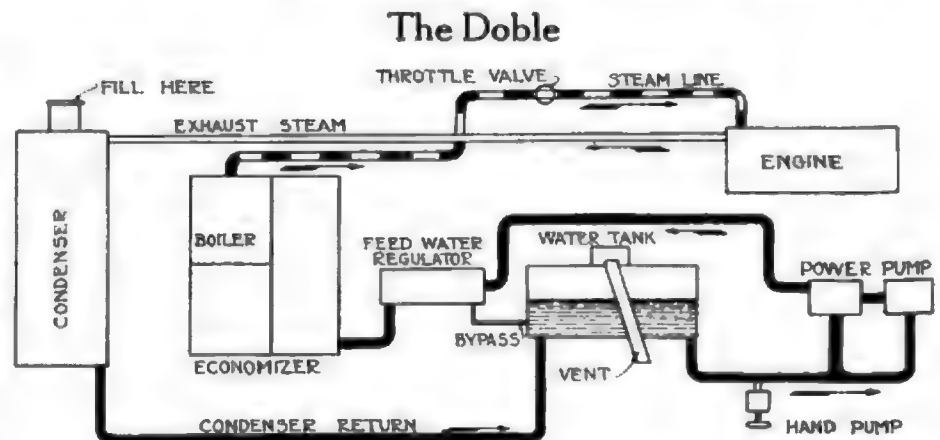


Fig. 3—Water and steam piping diagram of the Doble steam car. The cycle of operations is as follows: Water put into the condenser flows to the water tank by gravity. It is pumped by a power pump through the regulator and economizer into the boiler, where it is changed to steam. Steam from the boiler passes through the throttle into the engine, thence to the condenser, where it is reduced to water again.

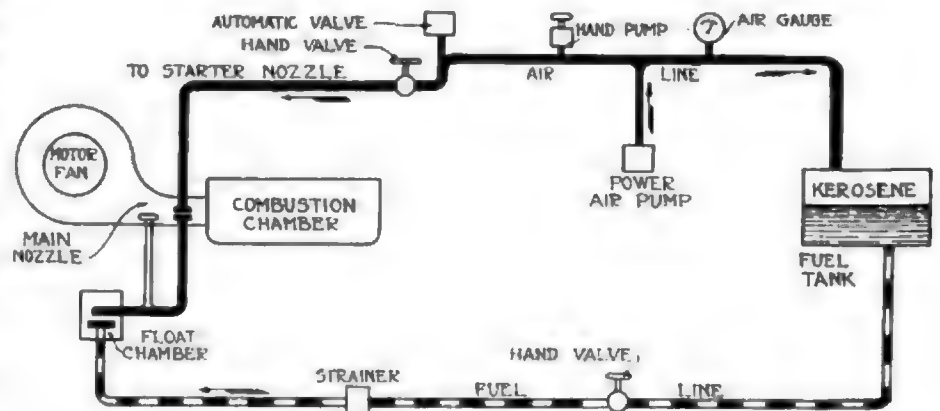


Fig. 4—Air and fuel piping: Air pressure of 2 lb. per square inch is maintained in the fuel tank. The blower motor is started through a switch, after which speed is regulated automatically by the steam pressure.



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Small Business Loan



Small Business Loan

Small Business Loan





1930s Ford Model A sedan, shown from the side.





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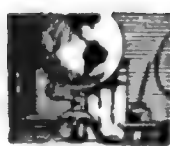


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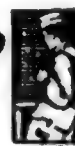


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The Readers' Clearing House



IN EXPLAINING TIRE PRESSURES Reader Doubts Difference in Pressure with Wheel On Jack

FOWLER, Ind.—Editor *MOTOR AGE*—Several weeks ago there was published in *MOTOR AGE* a statement that the tire pressure would register higher when the weight of the car was upon it than if it were not.

I wonder if the person answering this question ever tried the experiment of actually taking the tire pressure with the wheel on a jack, and again with the weight of the car resting upon it? The difference, if any, is too slight to be registered on an ordinary gauge.

I believe that the present method of rating engines by horsepower should be done away with. Horsepower terms are meaningless to the average driver, and as used now they are wonderfully inaccurate. I suggest instead that all engines be rated in cubic inches of cylinder capacity, which will afford an absolutely accurate comparison between different engines, which is the main thing.

2—Various tire manufacturers state that extreme cold is very hard on tires. Why is this?
—Elwood S. Ingraham.

1—Quite true the variation is too small to register on the ordinary tire gage. Nevertheless the pressure within the tire is increased. Take for example a football filled with air. Kick that football with your toe. What happens? It sails through the air buoyantly. Take the bladder out of that football and fill it with some substance such as ground cork, which will give about the same weight as the bladder. Now kick it again and what happens? It does not sail through the air like it did with the air-filled bladder inside. Why is this? It is because, upon impact of your toe, the air within the bladder was compressed, then as the force of the impact ceased, the air expanded again and gave a rebounding action which sent the football so much farther than when it was filled with cork. Air within an inclosed space is always compressed when pressure is brought to bear upon it. When it is compressed it is naturally under higher pressure.

2—Rubber is more resilient when warm than when cold. Thus in extreme cold it is liable to crack. The other extreme, excessive heat, is even more hard on the rubber, however.

EXPERT FAILS, ASKS MOTOR AGE Cannot Diagnose Trouble from Meager Description

Ripley, O.—Editor *MOTOR AGE*—I have a 1914 Hudson 6-40, which has developed a loss of power on the hills and a miss when going more than 25 m.p.h. on level ground. No mechanic has been able to locate the trouble. The valves have been ground, new Perfection multiple piston rings put in, the ignition has been examined and found to be all right, and the timing was O.K., but the trouble was just as bad.

When this car came from the factory it had a Zenith carburetor on it. The casting of this broke, so I got a new Model H-2 Stromberg carburetor. This helped the trouble for a short time, but now it is worse than ever. Kindly state where the trouble is.

2—What is the gear ratio on high gear of a 1914 Hudson 6-40, and how many revolutions per minute will the motor develop?
3—How many revolutions per minute will a Ford engine develop?—V. D. Williams.

1—No mechanic has been able to locate the trouble and still you ask us to direct you to it from the meager description you

IN WRITING AN INQUIRY to the Readers' Clearing House Department

DESCRIBE THINGS COMPLETELY!

If your car is giving trouble, tell us all about the trouble and what you have done to try to remedy it. Always bear in mind that we are not looking at your car when we are reading your inquiry. Try to picture everything to us as we might see it if we were looking at your car. You understand it. Make us understand it.

Do not write in and say, "My engine has developed a serious knock. What is the trouble and how can I remedy it?" It is as impossible to give an intelligent answer to such a question as it is to answer the question, "Why is a mouse?" Tell us where the knock is, what it sounds like, what effect it has on the operation of the engine, under what driving condition it is most evident, etc. Let us have some tangible information to work on.

Do not ask us questions concerning motorcycles and motor boats. Our field does not cover these industries. Do not ask us for working drawings of engines, gearsets, etc. We endeavor to conduct an information department, but not an engineering department of such a nature. We cannot design the mechanical units of a car for you. This also applies to specifications for speedster bodies to be applied to touring or roadster equipped chassis. We will gladly give a general plan of a body, showing how it might appear when complete, but we cannot furnish complete patterns and working drawings for the construction of these bodies.

give. It is impossible, much as we regret to turn you down.

2—The standard gear ratio is 4 to 1. There is no official record of the maximum revolutions per minute.

3—About 1800, although there is no official record.

Cannot Give Body Patterns

Springfield, Mo.—Editor *MOTOR AGE*—I am building a speedster body to fit a model 80 Overland and I noticed your sketch in the last *MOTOR AGE*, but there were a few points I could not understand. If possible, I wish that you would make sketch to show all views of the body. I am sure it would help show how to make the best body.

2—In regard to lowering steering wheel, if lowered as far as shown in the sketch, would it touch the exhaust pipe?—Gail H. Story.

1—You will note in the boxed story on the first page of this department that it

is quite impossible for *MOTOR AGE* to give complete designs for bodies.

2—Provision would have to be made for suitable clearance over the exhaust pipe. Although the sketch was not drawn to scale, a similar body could be built with provisions for everything to clear.

SPEED FIGURES ARE IMPOSSIBLE Readers Ask for Data Which Cannot Be Given

Omak, Wash.—Editor *MOTOR AGE*—What is the maximum speed of the Overland Country Club roadster with standard gear ratio, wind-shield open, top down, and two passengers?

2—Would Lygite aluminum alloy pistons increase the speed, and, if so, how much?

3—Is it advisable to use aluminum alloy pistons and connecting rods or merely pistons? What would *MOTOR AGE* advise?

4—Would cord tires increase the speed any, and if so how much?

5—Is the Radcliffe hydraulic transmission designed to be an accessory or a built-in feature? If an accessory, what is the approximate cost and method of installing on an Overland Country Club roadster.

6—What is the approximate maximum attainable equipped with the accessories mentioned in 1, 2, 4 and 5?—Bernard Parks.

1—There is no official record of the maximum speed of this car.

2—Probably if properly installed. One cannot possibly estimate the amount of speed increase.

3—Pistons are enough.

4—Possibly a small amount. No estimate is possible.

5—It is applicable to any car. We do not know the cost.

6—There is no means of estimating.

OIL LEAKS FROM HUPP GEARBOX Foreign Reader Wants to Know About Oxygen Carbon Removing

Melbourne.—Editor *MOTOR AGE*—In my 1916 Hupmobile there is a bad leakage of oil from the gearbox. I have had it attended to two or three times, but it still leaks. I used a mixture of grease and oil, then tried very thick special gear oil, but it leaks as bad as ever. What is the cause?

2—Is there any danger when going down a steep hill of switching off and when almost at the bottom to switch on again? In my first car, a Ford, I did this and blew the outside of the silencer off, so I have not tried it since.

3—Does kerosene mixed with petrol or benzine, in about one of kerosene to two of benzine, do any harm to the motor, or prove in any way detrimental, by causing carbon, and when cleaning the cylinders and pistons of carbon does the burning out by oxygen do the pistons any damage? I have been strongly advised not to have them done by that process.—T. H. Merson.

1—We are at a loss to understand just what this would mean or what is causing the leak, because there is nothing contained in the information you give us which would give an idea as to where the oil is leaking. Complaints of this nature are so few, according to the factory, that we could not by any means class it as a general trouble and give a remedy in that way. Therefore, we would advise that you write the factory, the Hupp Motor Car Corp., Detroit, Mich., giving its service department a thorough and complete explanation of the troubles you are encountering. If you are unable to do so yourself you should have



the valve stem slowly to the left or counter-clockwise until you have reached a point where the engine runs best. When a dense black smoke is emitted from the muffler it signifies that the mixture is too rich. The carburetor should be given more air as above described. Blue smoke signifies too much oil. Do not be confused with the two. When the engine misses at low speed the trouble is usually caused by too rich a mixture. The remedy is to give the carburetor more air. Should the engine make a coughing noise when the throttle is opened suddenly, it is caused by too lean a mixture, that is, too much air. The remedy is to reduce the air supply.

WANTS A MULTIPLE-SPEED FORD The Practicability of Such an Alteration Would Appear to Be Nil

La Farge, Wis.—Editor Motor Age—I have been thinking of putting a unit transmission and rear axle in my Ford in place of the regular Ford axle, and had planned on a Studebaker or Overland axle. Kindly advise me as to the size.

The advantage derived of this is:

Let W = low
Let X = intermediate
Let Y = high
Let Z = reserve

I would have a WW low.....	1
I would have a WX combined.....	2
I would have a W.....	3
I would have a WY combined.....	4
I would have an X.....	5
I would have an XY.....	6
I would have a Y.....	7

seven speeds forward beside reverse, or another combination on reverse.

What size axle would be required to stand up to the double low of the Ford and rear transmission combined?

What make of unit transmission and axle would fit the Ford universal housing, and also one of the same length of driveshaft?

Would like any additional information Motor Age is able to furnish. I also would have a good, reliable emergency brake, which alone would be a freak on a Ford.—Lester Green.

1—We would consider this highly impractical. We see no reason whatever for such a diversity of speeds in a Ford car. In the most severe driving conditions it has been our experience that the Ford two-speed gearset is capable of taking care of every need. The expense of this alteration would be prohibitive. The fitting of a new axle would require special castings and a list of new parts, all special, which would be staggering were you to figure it all out.

AN OLD MODEL BUICK SPEEDSTER Would Not Pay to Spend Much Money On Job

Bradner, Ohio.—Editor Motor Age—Is an old model 10 Buick good enough to convert into a speedster?

2—What would be the lowest approximate cost?

3—Would Motor Age advise changing the gear ratio and the valve timing if the ratio and timing are the same as when the car left the factory?

4—What was the gear ratio of this model when it left the factory?

5—Can the steering gear on this model be lowered, and how?

6—Advise as near as possible the cost of reconstruction.—Jesse French.

1—Yes, if you do most of the work yourself. It is not worth spending a lot of money on.

2—Probably between \$25 and \$50.

3—There is no need of changing the timing. The gear ratio could be changed for more speed. New gears would probably cost you about \$25, however.

What Not to Ask

Editor's Note—In preparing answers for the Readers' Clearing House of this week's issue, the editor came across a surprising number of inquiries asking how fast certain models will go and how much faster they would go if certain alterations were made upon them. These questions are quite out of our grasp, in fact they can be answered by no one.

Where manufacturers have made official speed records under the sanction of the American Automobile Association, we will gladly print the speed figures made during that test. Where no tests have been made there is no source of positive information regarding these car speeds and we see no reason why we should guess at it.

Furthermore, the idea of anybody estimating within 5 or 10 m.p.h. how much faster a car will go with aluminum pistons, higher gearing, etc., etc., is absurd. A poor mechanic may install new parts intended to increase the speed and do such a sloppy job of it that the speed will, in reality, be reduced.

The same thing applies to the maximum revolutions per minute of an engine. Two engines of exactly the same model may have a difference in maximum speed of 200 r.p.m. Furthermore, when the engines become used, the maximum changes. It depends to such a great extent on the adjustment and general condition of the engine that no reasonably accurate figure can be given. Another thing we cannot give you with any accuracy. That is car weights.

4—Motor Age has no record of the gear ratio of this old model.

5—The steering gear may be dropped down to any desired height and readjusted

so that there will be an equal amount of turning in either direction.

6—For a bucket seat skeleton body and incidentals about \$25. With new gears about \$50.

Speeding Up E. M. F.

Detroit, Mich.—Editor Motor Age—What is the best time racers have obtained out of an E.M.F. 30 racing car?

2—Kindly publish suggestions for converting a 1912 E.M.F. into a racing car.

3—Would the increased efficiency gained by boring out and reseatting larger exhaust valves be worth the expense and trouble?

4—What does Motor Age think of counterbalancing the crankshaft on a four-cylinder motor?

5—What would be the best gear ratio on high for this model? I want to obtain the fastest mile I can get out of the car.—O. F. Helmkamp.

1—There are no late official records.

2—Suggested lines are illustrated in Fig. 3.

3—Yes, if the rest of the chassis is in good condition.

4—It will hardly pay in a car of this age.

5—It should be able to pull with 2½ to 1 gear ratio if cut down as indicated and the engine is tuned up.

Maxwell Speedster Body

Groton, S. D.—Editor Motor Age—Kindly show by diagram how to rebuild a 1918 Maxwell Mascot touring car into a racer.—M. J. Jones.

Suggested lines are illustrated in Fig. 2.

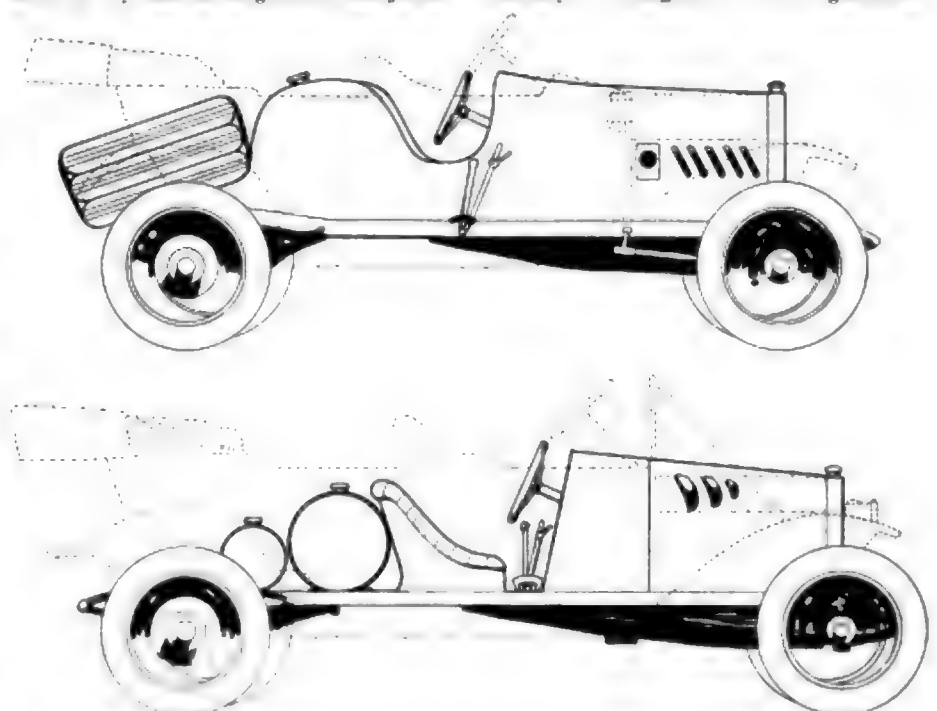
Magneto No Generator

Griffin, Ind.—Editor Motor Age—I have a model 88 Overland equipped with a Remy low-tension magneto. Will the use of a transformer eliminate the use of dry cells for starting? Will this magneto furnish enough current for a small spotlight?

2—The present pinion gear has thirteen teeth. Will I noticeably increase the speed if I substitute a pinion with fifteen teeth, using the same differential gear and present wheels and tires?

3—What would be the result if I should cut 1 or 1¼ in. from the lower end of the pistons. Would this cause the cylinder walls to wear excessively?—Charles C. Miller.

1—A transformer cannot be used successfully. A magneto is not a generator



Figs. 2 and 3—Maxwell 1913 Mascot converted into speedster. A 1912 E.M.F. cut down at small cost

and will not furnish current for a spotlight.

2—The speed would be increased somewhat. You must be sure that the larger pinion is of the correct pitch to fit into the ring gear.

3—It would undoubtedly cause the piston to slap, that is the bearing surface would be so reduced that the piston would tend to wobble in its course up and down the cylinder.

BODY FOR CONVERTING CADILLAC Cantilever Springs Could Be Used to Reduce Height

Topeka, Kans.—Editor MOTOR AGE—Give an illustration of a body to be used in converting a 1915, eight-cylinder Cadillac into a racer. I want everything to be as low as possible and the fenders removed.

2—Explain how the steering wheel and frame may be lowered, and, if possible, how may the lift of the valves be increased? I want the cowl to extend back on a straight line with the hood, to the steering wheel. I wish to have a gasoline tank back of the low seat, and the extra tires placed back of the tank.

3—What would be the approximate speed of this car under favorable conditions, and what would be the cost of building the body? I do not want the car for racing, but want a fast car for driving around town and in the country.

4—How would a lower gear ratio do on the rear axle of this car?

5—Kindly suggest some improvements that would tend to increase the speed.

6—Could the two speed rear axle be fitted to this car, which was used on the 1914 Cadillac? If so, would this be advisable?

7—If the car can go 58 m.p.h. now, what would be the speed when rebuilt?

8—Give an illustration of a rebuilt Simplex car.

9—What speed is the Simplex guaranteed to make, and what would be the speed with a racing body?—G. Huycke.

This is shown in Fig. 4. In order to reduce the over-all height of the car cantilever springs have been fitted in the rear. This respringing of the entire car would be a costly alteration but goes to show what might be done were one willing to spend that much money.

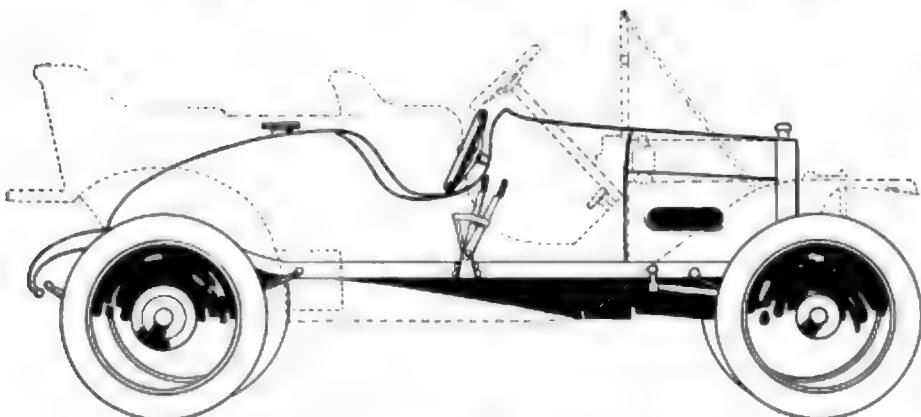
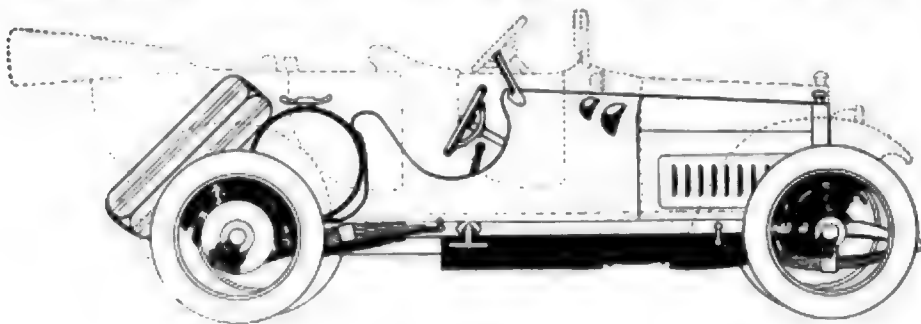


Fig. 4 and 5—Speedster body for 1915 Cadillac eight with cantilever springs to reduce over-all height. Model 19 Haynes cut down with racer body

2—The steering wheel may be lowered by dropping it down to the desired height and resetting the split sectors about the worm so that the steering wheel would turn the front wheels an equal amount in each direction. It would require a new camshaft to increase the lift of the valves.

3—There is no means of estimating the speed. You might get the body built for \$500.

4—There is really no need of a low gear ratio. The car has all the speed you can use and you would rob it of a great deal of its flexibility were you to lower the ratio.

5—It is our opinion that you would waste money trying to increase the speed. This engine is designed throughout for its present maximum speed. Why increase it and impose a tax on the parts?

6—It would not be advisable.

7—With a lighter body you could expect some increase. However, there is no way of giving you even an approximate estimate, inasmuch as there are so many factors which enter into it.

8—You would be obliged to inform us of the model.

9—Simplex does not guarantee a speed to our knowledge.

Schools for Acetylene Welding

Editor's Note—In the issue of Feb. 1 there was an inquiry concerning an oxy-acetylene welding school. MOTOR AGE replied to the inquirer that there was no school in which welding by this process was taught, which was an erroneous statement. A thorough course in this operation is given by the Michigan State Auto

School, Detroit; the Howard Auto Laboratories Co., Des Moines, Iowa, and the Sweeney Automobile School, Kansas City, Mo.

It might be interesting to know that there are fifteen instructors in the Michigan State Auto School who are members of the Society of Automotive Engineers. Faculty meetings are held weekly and new developments in motor car engineering are discussed, with the view of having every department of the school thoroughly up to date at all times.

Converting Old Haynes

New York.—Editor MOTOR AGE—I have had in mind converting my model 19 Haynes five-passenger. Would you publish a drawing as you have done for others?

2—Do you think the radiator now in use will look well or would you replace it so as to get the proper lines?

3—The weight is about 2,400 lbs. Do you think after taking off weight it will permit using lighter front springs?—Edward J. Ellison.

1—Illustrated in Fig. 5.

2—A different shape would give a racier appearance.

3—Very little of the weight reduction is at the front end. You will not be able to use springs very much lighter than those at present employed.

No Maximum R.P.M. Record

La Harpe, Ill.—Editor MOTOR AGE—What is the fastest speed r.p.m. ever obtained by a gasoline motor car engine?

2—Where are the Leavitt aluminum pistons manufactured?

3—Where can I obtain an Isotta Fraschini catalog?

4—What is the price of the Packard aviation motor used in the Packard racing cars?—D. W. Woolsey.

1—There is no official record of a highest engine speed.

2—Walter M. Leavitt Co., New York City.

3—Isotta Fraschini Motors Co., 1920 Broadway, New York.

4—No price has been fixed for public presentation. You might write the Packard Motor Car Co., Detroit, for this information.

Wants More Light for Saxon

Nolensville, Tenn.—Editor MOTOR AGE—In the Saxon six 16, model A 15 c.p. ordinary bulb is used in the headlights. I would like to get a little more light from my lamps and would like to know what c.p. nitro bulbs to purchase. This car uses a 6-volt Exide battery.

2—Would it be advisable to replace the tell-tale of this car with a dash ammeter? If so, explain how to connect.—A subscriber.

1—We would suggest a 24 c.p. nitrogen lamp.

2—The tell-tale serves the purpose of an ammeter. There is really no need of changing. If you desired to use an ammeter, however, you could attach it directly in the place of the tell-tale.

Setting Ford Bearings

Saskatoon, Sask.—Editor MOTOR AGE—In overhauling Ford motors is it advisable to set all the bearings so as to start the motor by hand or by towing?

2—Give the names and address of manufacturers of ball bearing thrust washers for Ford cars.—Franklin Garage.

1—These should be so set that the engine can be started by hand.

2—Where do you intend to use these thrust washers?



The Motor Car Repair Shop



Hints from Readers

Finding Polarity of Wires Chemical Method Which May Be Used in Storage Batteries

EAST ORANGE, N. J.—Editor **MOTOR AGE**—A simple method of determining the polarity of wires is as follows:

Take a piece of blotting paper, place a few grains of iodide of potassium on it and wet the paper and the salt will quickly dissolve. The iodide may be purchased at any drug store. Then touch the wet paper with the two wires and the positive wire will produce instantly a black stain on the paper.

If the two wires are introduced into a bottle containing such a solution, there will be a steady stream of dark red given off from the positive wire, this being metallic iodine reduced by the electric current.—James H. Webb.

Recharging Ford Magneto Method Does Not Require Gearing Down Car

Greensburg, Ohio—Editor **MOTOR AGE**—The Ford magneto may be charged in the car. Six fully charged 6-volt, 60-amp. storage batteries, a compass and some wire are required for doing the job. The storage batteries are connected in series and the negative wire is grounded on the car. The positive wire should have a rod attached to its end and then the magneto plug should be removed and the rod thrust in to make contact with the magneto inside the cover. Place the compass a small distance behind and at the left of the hole for the magneto plug and have some one turn the engine over until the needle points to the front of the car. Then open and close the circuit by removing the negative wire from the car. The circuit should be held closed for 6 sec. at a time and then broken, this operation being done twenty-five times.—Maurice Prentice.

Gasoline Cleans Magneto Things to Look Out for in Using Dangerous Fuel

SALT LAKE CITY, Utah—Editor **MOTOR AGE**—Due to its rapid evaporation gasoline is selected frequently to wash the magneto free of external dirt or dust. Quite frequently, too, the contact breaker and the region thereabouts are given a good dousing. The need of caution is because gasoline of to-day does not evaporate as readily as it did when refiners supplied a higher test fuel, and in consequence the

More Ideas

Motor Age readers are coming through, slowly, with some good repair shop ideas. Do not be reluctant to send your ideas to us. If they help you they will surely help somebody else, no matter how crude they may seem in your own mind. The simplest way of doing a thing is always the best, and if you can do it with a crowbar then why use an arbor press?

It takes all we have got this week to fill up this one page. Wake up men! Send enough through so we can have some ahead at all times. There is no reason why this department should not take up two pages, and it is up to you to help us out. Look at it this way. Suppose you send one valuable suggestion that is printed in **Motor Age**. There will be anywhere from three to a dozen more printed the same issue, and some of them are going to help you out. That is fair exchange, is it not?

If you read the articles on this page and find yourself benefited by them, stop and think of something you are doing which you have not seen done before. You may even have a new way of washing a car. Some clean method of filling grease cups. Such things are not trivials. They are a great help to the man who is doing it in a more difficult way.

surface of the washed magneto retains a film of gasoline longer than at first suspected. Should the engine be turned over directly after cleaning the magneto, a spark from the contact breaker would set fire to the film of gasoline which covers the magneto and what would result is hard to say—maybe little, maybe much.

If the wires to the spark plugs have been removed, here is an additional possibility of a fire, for gasoline may be forced into the chamber of the external spark gap, and should any contact cause the magneto's armature to be rotated, a spark would pass across the spark gap and light the liquid.

There is no danger of any of this occurring if the magneto is wiped dry, gasoline used sparingly and the magneto or car not put into immediate operation. Just common horse sense saves a lot of trouble.

Another point; should the magneto be taken apart completely it is not entirely wise to wipe all parts in gasoline and then

assemble. It would be preferable to wash all parts thoroughly in gasoline and then in clean kerosene oil, for when steel parts are washed in gasoline they become absolutely dry as soon as the gasoline evaporates, which causes these parts to become more susceptible to rust. Ball bearings in particular are parts which suffer from this treatment. When they are replaced they should be given a thorough covering of light oil, not soaked in it. This not only lubricates but protects against rust.

The armature can be washed in gasoline, but it is not good practice to permit it to soak, as the armature covering may be softened and a possibility exists of damaging the condensers also.—John Boardman.

For Honeycomb Radiators What to Do If Defective Cells Spring a Leak

Kansas City, Mo.—Editor **MOTOR AGE**—It sometimes happens that, owing to a fault in the process of manufacture or an accident, one or two of the cells or tubes of a cellular or honeycomb radiator may spring a leak. In such cases a quick and effective repair may be made by plugging up the ends of the cells or tubes themselves with soft lead or a piece of wood whittled or cut so as to fit snugly into the ends of the cells. When plugs are used they should be driven in from the front and back of the radiator and then cut off and carefully hammered flush with the surface; or if convenient have a tinsmith solder around the edges of the lead plugs. Unless an expert, one should not attempt to solder a radiator, for one is very apt to open a few of the surrounding cells and cause more harm than good.

Radiator leaks are hard to find, usually. They may be detected often by steam issuing from them, but if this is not the case, and the exact spot from which the water is escaping cannot be determined readily, the best thing to do is to remove the radiator. Plug up all the openings, such as inlet and outlet, except one, with cork or wooden plugs. Then, into the opening which still remain open place a plug through which the plug of a tire pump passes. Place the radiator in a tub of water and pump air into it by means of the tire pump. Bubbles will issue from the leak or leaks, which should be marked immediately with chalk so as to be located easily later when the repair is to be made. Of course it is quite imperative that the plugs seal the radiator very nearly air tight.—Bernard Foster.









Antarctic Ice

Antarctica is the southernmost continent, surrounded by the Southern Ocean. It is the only continent without a permanent population. The continent is covered by a thick ice sheet, which is the largest ice mass on Earth. The ice sheet is made up of ice that has accumulated over millions of years. The ice sheet is the source of the icebergs that float in the Southern Ocean. The icebergs are made up of ice that has broken off from the ice sheet. The icebergs are the only source of ice that can be used for drinking water.















special bodies mounted on trailers. The officers and performers will have Pullman car bodies for sleeping apartments. The hands will have bunk, or caboose, cars. Other trailers will carry cages and stalls for the horses. Six horses will be carried to a trailer; four camels, two small elephants, and one large elephant.

Since time immemorial circus day has started its regular program with the morning parade at 10 or 11 o'clock, though for the small boy it has started much sooner. It has ended with the grand pageant in the Big Top shortly before midnight. Between days the members of the outfit have slept 8 hrs. or traveled to the next town. This motor circus will make jumps averaging about 35 miles, none farther than 50 miles, except over Sunday. And further, Spellman is not content with the old 11 o'clock parade. He is determined to make the jaunt from town to town a parade and by advertising to see to it that the audience takes rail seats all along the route, so that he may pass in dignity.

Trips of 5 Hrs.

A truck is expected to take 5 hrs. usually for the trip to the next town. This will permit starting as late as 5 o'clock in the morning and arriving in time for the parade to start between 10.30 and 11. The performers can sleep 10 hrs. if they wish, though the last 5 hrs. will be taken en route probably, if they travel at night, especially.

Each member of the company is expected to eat his last meal at 5 o'clock in the afternoon. Half an hour later the culinary division will be on the road for the next town, picking up needed supplies as it leaves. It will reach the site of the next show between 10 and 11 p. m. so that the crew may have a good rest before getting breakfast for the earliest of the other divisions.

The whole circus will be going full blast at 8.30 at night. By 9 the public will have abandoned the side shows for the Big Top, and the smaller tents can be struck and started on the road. The menagerie tent also can be sent on ahead, as has been done in these truckless years. As each act finishes its turn the traps, equipment, costumes and animals belonging to it will be packed and loaded. Then, when the grand finale has ended, the Big Top itself, the equipment of the main acts and the seats only will remain to be loaded, and the public will emerge to a vacant, wind-swept stretch of torn papers and trampled earth—the circus will be over. By midnight the entire circus will be gone.

The last division to leave will reach the next lot between 3 and 5 o'clock in

the morning, if it leaves immediately after the final performance. It may stay on the old lot or at the roadside until then and make the run into the new town by daylight.

So far the daylight method is preferred. If longer jumps must be made the schedule will be arranged so that these can be made over Sunday. The parade will be made up at the new grounds each day, the daylight ride being in addition to the old parade. What a future for the small boy! He'll surely like the trucks, for two parades beats getting up at 4 to see only darkness, though you can hear horses.

An Engine Accompanist

Imagine the ornate, gilt-bedecked band chariot with a so-many-horsepower engine giving purring accompaniment to the flare of trombones and the beat of the big bass drum! Or a lion pacing back and forth as if it were at all possible for him to be more powerful than the motive power that bears his cage in the parade!

From city to city and from town to town truck and its cargo will offer very little inducement compared to what it will offer in its daily parade. For canvas is to cover each truck and keep its wonders in concentrated form for better time. Only in the parade are the circus fans to see the gilt and red and beasts and clowns in full war paint, according to present plans.

Altogether, there will be 130 trucks, and these will range in capacity from 2 to 3 tons in weight, giving a total capacity equivalent to a 65-car show. All properties, including the advance, will be transported from place to place by these trucks. It is estimated that the 130 trucks will cost somewhere around a half million dollars. Some of them will be service trucks proper, though they will be decorated also to make the parade more impressive. Some of the trucks, or cars as they more likely will be called in circus talk, will be special cars, built solely for display, things of beauty and joys forever, so to speak. Each will be able to accommodate twenty persons on occasion.

The show is to open probably at Newark, N. J., and will go from there through New England, back across up-state New York, Pennsylvania, Ohio and the Middle West, circling back later in the season. The corporation has been organized a year and is capitalized fully, the stockholders being located over the territory which is to be covered by the circus.

The whole policy of the new concern is one of co-operation rather than exploitation. The circus will be a motor show throughout, special motor events being scheduled in the performances and motor

curiosities in the side shows perhaps. The parade will be a traveling motor show, representative cars of all makes being included in it. Manufacturers of the equipment have agreed to co-operate in the publicity for the exhibition, as mentioned in preceding paragraphs, and will have their own feature vehicles with the convoy and in the parade.

Meanwhile, the work of getting the great organization ready for the road goes on. At the offices in New York the executive force is as busy as any small boy ever was carrying water for the horses. And, by the way, do not get the idea that no longer can the small boy earn his way into the Big Top by the sweat of his brow. For there will be the performing horses to demand more water, and even the trucks may permit a few gallons to be brought to them.

But there will be a difference to the lay public in this way. They will miss the over-burdened horse of the big, shaggy hoofs, who after hauling the great drays of canvas, stakes, tent poles and other equipment from the sidetracks must needs arch its neck at the command of the checkrein in the parade. The motor truck with its immense, naturally giant-like tires will have taken its place, and there will be no sidetrack for the motorized circus.

Entrance and Departure

Do you remember watching the agile acrobat of the night before grudgingly climb into the horse-drawn vehicle, which was a cross, more or less, between a patent medicine vender's van and a railroad bus, and perch precariously on a hard seat while he and his family, other members of the acrobatic troupe, were hauled laboriously out of town? That was without the benefit of railroad, of course, and on the schedule made by circus managers, but what a different transportation from the truck of this circus!

The acrobat will enter a motor vehicle constructed after the plan of a Pullman car, with sleeping compartments that make up into day coaches, in a way. He and his companions will have all the comforts of Pullman accommodations with no trip to the railroad tracks. And the departure from the circus lot will be swift, sure and confident of a good passage to the next stopping place.

"When that circus came to town, we were the first two on the ground," or so we're told the old song goes. And when this circus comes to town, such will its superior charms be, what reason is there to think that the old song will not still be new for the small boy and his pal?



Decoration Day Race Off

Strongest Supporter of Motor Car Contests Out for Season at Least

Indianapolis Thinks Speedway Events Out of Order

CHICAGO, March 26—The decision of the Indianapolis speedway not to hold any motor car races this year and the calling off of its Decoration Day 500-mile race scheduled for May 30, as announced by James A. Allison, means that the strongest supporter of racing in the country is out of the sport for this year and perhaps longer, in case war continues. The Indianapolis speedway has called off its entire racing program solely because its owners do not believe that there should be professional sport, such as motor car racing, with the country in a state of war. Mr. Allison believes in amateur sports during war time but not professional sport.

While Indianapolis speedway has declared itself out of racing this year, it is not going to place any barrier in the way of other speedways, and as a result its team of racing cars is for sale. The Prest-O-Lite racing team, owned by Mr. Allison, consists of two Peugeots and three Premier cars. All are for sale, with the exception of John Aitken's Peugeot, which is being locked up for the year.

The racing drivers of the Indianapolis team are free to make whatever arrangements they may want to.

Offers Factory to U. S.

The racing factory, built near the speedway, in which Mr. Allison was going to build racing cars and parts, and which factory, measuring 140 by 80 ft., is well fitted with lathes, milling machines, grinders and all other kinds of necessary machinery, has been offered to the government to use as it sees fit. Besides this, the entire Indianapolis speedway, with its 2½-mile brick track, has been offered to the government so that it can be used as an aviation field or for any other purpose desired.

It is doubtful what influence the withdrawal of Indianapolis from speedway racing will have on other speedways. As soon as Indianapolis' decision to withdraw was known, the Chicago speedway and also Cincinnati speedway applied to the American Automobile Association contest board, New York, for sanctions for a Decoration Day race. It is expected that the contest board will oppose such a plan and rule that Decoration Day should not be given any speedway sanction. There is a strong feeling that this day belongs to the soldiers, and in case of war the sentiment would naturally be stronger.

David F. Reid, president of the Chicago Speedway Association, expects that the racing program on his speedway will be carried out as usual this year. Manager

Reid has wired the Secretary of War, offering him the use of the Chicago speedway for military purposes should necessity arise. It is certain that many of the speedways would be very suitable for military purposes. At the outbreak of the European war the premier speedway of the world, the cement Brooklands track, was turned over as a testing ground for aviation and motor truck works and has been utilized as such up to the present.

So far as the other speedways are concerned nothing has been received that would indicate that they are out of racing for this year. Cincinnati has requested a Decoration Day date. New York speedway, known as Sheepshead Bay, is in financial difficulties but promises to get cleared away soon.

The Cincinnati Speedway Co. expects to run its races of June 23 and Sept. 4, as scheduled some months ago, but H. S. Lehman, president, states the speedway will be turned over to the government if it can be used by it in any way. This speedway was built by the citizens of Cincinnati, much as a municipal enterprise. It cost \$700,000, and every dollar has been paid. **No Action on Speedway Offer**

Washington, D. C., March 26—Special telegram—No action has been taken by the war department on the offer of the Indianapolis Speedway to turn the speedway and the racing car plant over to the government for use in making and repairing airplanes and for an aviation training station. While such an offer may have reached the war department, it has not yet been sent to the aviation section. Experts of the aviation section believe that Indianapolis is admirably located for an airplane station, either as a training station for aviators or for the making and repairing of airplanes. Location of the speedway near Fort Benjamin Harrison, one of the biggest and most modern of army posts, and its proximity to Indianapolis, a motor manufacturing center, where supplies would be easy to get, makes the speedway an ideal location.

300 Racers Respond to Call for Service

NEW YORK, March 27—Special telegram—Over 300 racing drivers registered with the A.A.A. Contest Board have signified their availability for military services in case of war. Of these approximately half have signified that they would prefer the aviation corps and the other 50 per cent motor car service. The present vote is the result of a letter mailed Feb. 19 by Richard Kennerdell, chairman of the contest board, to all registered drivers and registered mechanics. Chairman Kennerdell drew attention to the necessity for preparation to join the United States service in the event of war and inclosed a blank to be filled out, signifying which service was preferred.

Racers' Squad Planned

Rickenbacher and Aviation Captain Consider Aerial Formation of Drivers

Twenty-two Have Been Invited to Enlist

NEW YORK, March 26—Formation of an aerial squadron, to be composed of prominent motor car race drivers and their mechanics, was considered at yesterday's conference between Captain W. G. Kilner, commanding the aviation field at Hempstead Plains, and E. V. Rickenbacher. Under the plans proposed the squadron would be composed of twelve airplanes and 133 men. Twenty-two drivers and their mechanics have been invited to enlist. If the squadron is formed it probably will be trained at Indianapolis, Ind., Detroit, or New York.

Representatives of the Advisory Committee on Aeronautics, which is co-operating with Rear Admiral Usher of the Third Naval District, have just returned from Washington, where they conferred regarding a great aeronautic station in this city.

With twenty-five of the leading racing drivers banded together as airplane pilots, it is to be expected that the government will get better service than if these men were in different sections of the country. Rickenbacher so far has received affirmative replies from Henderson, Chandler, Disbrow, Gregory Flinn of the Rajah Co. and Ralph dePalma.

It is understood that Eddie Pullen, the Mercer pilot, is organizing the racing men on the Coast.

GETS DIRIGIBLE CONTRACT

Akron, Ohio, March 24—The Goodyear Tire & Rubber Co. has been commissioned by the Navy Department to make and demonstrate nine of the sixteen dirigibles authorized for use in coast and harbor defense. For several years the Goodyear company has been interested in aeronautics and has furnished spherical balloons for training purposes, as well as kite balloons for military observations. The coast patrol dirigibles which are being built are of the non-rigid type, that is, without interior framework, and are designed to operate from shore bases.

The dirigible envelopes, or gas bags, twelve of which are being made at the Goodyear factory, are 160 ft. long and 31½ ft. at the maximum diameter. The gross lift is 5275 lbs. under normal conditions, and the engines are to be 100 hp., of the Curtiss type.

The dirigibles will carry two men, the pilot and an observer, and will be equipped with radio communication. It is expected that a speed of 45 m.p.h. may be maintained for 10 hrs. In ordinary cruising the

dirigibles are designed to operate at about 35 m.p.h. and at such speeds will carry enough fuel and ballast to operate continuously for 16 hrs. at heights varying from a few feet from the ground to a maximum altitude of 7500 ft.

Delivery is to be made about Aug. 1. In addition, several kite balloons for military observations; spherical balloons for training purposes; and other dirigibles, with airplane tires and other rubber accessories for airplanes, are being constructed at the Goodyear factory.

BABCOCK GETS GOVERNMENT ORDER

Watertown, N. Y., March 23—The H. H. Babcock Co., Watertown, N. Y., has closed a contract with the Government to furnish 500 ambulance bodies to be used on motor truck chassis by the medical corps. The contract calls for delivery within six months. The sample body on which the order is based has been approved by the medical board. It was in operation in Washington for more than a month before the order was placed. The contract is said to represent about \$150,000. The company will run its plant at full capacity to fill it and hopes to be able to make delivery before the six months are up.

HOOSIERS TALK WAR

Indianapolis, Ind., March 24—The function of motor car engineers in war time will be one of the subjects of the March 30 meeting of the Indiana section S. A. E. This will be discussed by F. E. Moskovics of Nurdyke & Marmon and a member of the council of the S. A. E. Other papers will be presented by Ferdinand Jehle, service engineer of the Aluminum Castings Co., on problems of aluminum engine construction. Mr. Nelson of the engineering department of the Premier Co. will touch on the peculiarities of camshaft design for aluminum overhead engines, and Albert Champion, vice-president Champion Ignition Co., will tell about spark plugs' limitation in high-speed engines.

MACHINE GUN CARS ARE TESTED

Detroit, March 23—Cars are being tried and tested these days to determine which are more fitted to meet the needs and requirements of the Government, and during one of these tests one of the new Studebaker machine gun cars maintained a speed of 25 m.p.h. over the 250 miles between El Paso, Tex., and Deming, N. M. The first part of the trip from El Paso, Tex., is over fairly good roads, but from Mesilla Park, N. M., to Deming, N. M., there are 70 miles of desert sea and a slope up to 8000 ft. above sea level at Deming, N. M.

Each car contains two machine guns and their equipment, 20,000 rounds of ammunition, tools, water, gas and oil, field rations and seven passengers beside the driver, a total weight of 24½ tons.

Motors in War Plans

Council of National Defense Considers Aid Available from Plants of Industry

No Factories Have Been Taken Over Yet

WASHINGTON, March 26—Within a few days the United States, in all probability, will have been declared by Congress to be in a state of war with Germany, though such formal declaration will result in little change in plans by the government from those already made, due to the fact that in anticipation of such action the United States is to-day financially, commercially and industrially prepared to the extent that this is possible. The Council of National Defense, which has been working for more than a year with the heads of the war and navy departments, has seen to it that business has done its part.

The exact situation is that up to this hour the Government has taken over no factories of any kind, but it is ready to do so at a moment's notice, that munitions, trucks, airplanes, motor boats, commercial and passenger cars, accessories, wagons and hundreds of other articles necessary to the common defense may be made immediately available.

Skilled Labor Mobilization

Possibility of the mobilization of skilled labor in munitions, motor car and other manufacturing institutions almost at a moment's notice will mean that the United States will have profited by the oversight of England in this connection. The cabinet has just had under discussion this keeping of the country's supply of skilled labor mobile and ready for any emergency, and the subcommittee of the Council of National Defense on manufactures, headed by Howard E. Coffin of Detroit, has practically completed plans for supplying artisans to the munitions plants in any number necessary to operate those owned by the government or privately owned, also, for the conversion of manufacturing plants best fitted for the making of munitions, such as motor car plants and others, the usual character of construction of which would make them most adaptable with a minimum of effort to the making of munitions.

While insisting that the policy of the country must be finally decided upon by Congress, Secretary of War Baker, in discussing the present situation said, in part:

"All that you can say of the War Department is that it is pressing ahead all purchases of everything that will be needed to equip an army, if the army is to be called upon."

This statement of Secretary Baker doubtless means that great numbers of passenger cars, trucks, accessories, etc., will be needed and will be bought, if the actual purchases have not already been

authorized. One plan of the government is said to be to equip an army of 500,000 volunteers. If this is done it would more than double the demands for motor cars, trucks and other cars, as the present regular army and the National Guard forces of the country combined represent but about 300,000 men. Transportation, not only as between distant points but in connection with the daily movements of units of the army, will be one of the most important features to which attention will be given, and this means that great numbers of trucks will be necessary.

No Trucks Ordered

Washington, D. C., March 26—Col. Chauncey B. Baker of the quartermaster's corps of the army states that the war department has not given orders for the purchase of additional motor trucks for the army. The last purchase of trucks made was for the Pershing expedition and for the troops along the Mexican border. Army officers are not inclined to discuss prospective purchases of motor trucks or other supplies until an order is ready to be given. The Council of National Defense has, however, matters in such fine shape that the purchase of trucks, when needed, and other motor supplies could be made promptly and satisfactorily.

FAGEOL HALTS ORDERS

Oakland, Cal., March 24—The Hall-Scott Motor Car Co., maker of the Hall-Scott aviation engine, which is being used in the new Fageol car, has received an urgent request from the War Department to use every effort to furnish all available aviation engines for the next six months. The Fageol Motor Co. has agreed to allow the Hall-Scott Motor Co. to use its allotment for this period to help in filling the demands of the Government. Consequently, the Fageol Motor Co. will accept no further orders for cars until the present needs of the war department have been filled and engines again can be obtained from the Hall-Scott Motor Car Co.

SCHOOL FOR PREPAREDNESS

Detroit, March 26—The Michigan State Auto School has offered its buildings, equipment and services of fifteen instructors for the use of army officers who may wish the specialized training in motors, trucks, etc. The school has also offered to assist the government in getting in touch with truck drivers, candidates for the airplane corps, operators of submarine chasers and others wanted for specialized positions. A. G. Zeller, president of the school, has written the Government offering the list of the 4200 graduates of the school.

RULING AFFECTS SPEEDWAY

New York, March 26—A new stage was reached in the financial difficulties of the Sheephead Bay 2-mile motor speedway on Long Island when the Supreme Court

in Brooklyn handed down a decision today ruling that the Sheepshead Bay Speedway Corp. is indebted to the Coney Island Jockey Club to the amount of \$2,135,161.86 and granted to the club a judgment of foreclosure on the corporation's exhibition grounds at the old Sheepshead race track.

The Sheepshead Bay Speedway Corp. has at present a committee working along the line of financial reorganization, and it is expected that the speedway will be continued as it has in the past. The sentiment is strong that New York can support a speedway. Contests up to the present have not been a financial success, due to the very heavy overhead charges. When the speedway was built there was not sufficient money subscribed to meet construction obligations, and ever since the first meet there has been a heavy debt.

HAS A. A. A. REPRESENTATIVE

Chicago, March 24—Prominence of Chicago as a contest center is emphasized by the appointment this week of a special representative of the American Automobile Association contest board for this city. Chicago is the first city to have a special representative. L. R. Hillman, local branch manager of the Hess-Bright Bearing Co., will serve in this capacity. In addition to being the general contest board representative in this city, Hillman also is the technical representative of the A. A. A. for the middle western territory, and it is the large number of sanctioned tests in this territory in addition to the speedway events that has made a special representative necessary.

INCORPORATES FOR \$6,000,000

Kalamazoo, Mich., March 23—The States Motor Car Co. has been refinanced for \$6,000,000 by Thomas B. Nevin & Son, B. F. Yoakum, and associated New York capitalists. The new concern, which includes both the States Motor Car Co. and the States Motor Car Mfg. Co., has been incorporated in Delaware and will make a four to sell for less than \$900 and a six to sell for less than \$1,200. It plans to manufacture 6000 cars during 1917.

TAKES BRUNSWICK TIRE SALES

Chicago, March 26—J. W. Maguire has been appointed general sales manager of the rubber department of the Brunswick, Balke, Collender Co., main office in this city. This company entered the tire business in January of this year when its new factory at Muskegon, Mich., was opened. Since then this factory has been producing 500 casings and tubes a day. Plans are under way to extend the manufacture to truck tires of all kinds, rubber belting and other rubber lines. At present sales are being carried on through the fifty-six branches of the company, but Mr. Maguire expects to start establishing agencies and build up a broader sales organization.

Houk Interests Merged

Wire Wheel Corporation of America Takes Over Pioneer's Patent Rights

Deal Clears Complex Situation That Threatened Litigation

NEW YORK, March 26—The wire wheel patent situation in the United States has been clarified by the acquisition by the Wire Wheel Corporation of America of patents covering wire wheel manufacture. The culminating step in negotiations was the sale of the Houk Mfg. Co. and George W. Houk Co., its sales organization, to the Wire Wheel Corp., which took place last week. Mr. Houk retains an active interest, becoming vice-president of the Wire Wheel Corp.

Besides entire American rights of Rudge-Whitworth patents the Wire Wheel Corp. has acquired Dunlap, Cowles, House and Houk patents, the entire group covering every phase of wire wheel construction, according to advice of prominent patent attorneys. Negotiations are now under way with other wire wheel makers with a view to issuing licenses.

The Wire Wheel Corp. was formed with \$2,000,000 capital by a syndicate in which Bertron, Griscom & Co. and Jamieson, Houston & Graham, Inc., were active. John F. Alvord, president of the Standard Co., Torrington, Conn., Splittorf Electrical Co., and Hendee Mfg. Co., heads the new concern with George W. Houk and R. E. Griscom as vice-presidents and S. A. Fahnestock, secretary and treasurer. The East Springfield plant of the Hendee Mfg. Co., covering 10½ acres and 175,000 ft. of manufacturing floor space has been acquired and will produce wire wheels for high-priced cars and also develop wheels for low-priced cars. The Houk plant at Buffalo will be enlarged by 100,000 sq. ft. and the production of Houk wheels will be greatly increased. The Houk output gained 300 per cent in 1916 of 1915 and in 1917 to date is running 400 per cent ahead of 1916. The executive committee of the Wire Wheel Corp. is J. F. Alvord, R. E. Graham and R. E. Griscom. Among the directors are these: Marshall J. Dodge of Bertron, Griscom & Co., and Jacob Bretz, Bearing Co. of America.

The Wire Wheel Corp. has ample funds and expects that wire wheel market will expand to a marked degree to its ability to produce in large quantities without fear of patent litigation.

DEPPE TO BUILD CARS

New York, March 27—Special telegram—The Deppe Motors Corp., a new organization very strongly backed financially and controlling patents regarding using heavy fuels in engines, promises to take an im-

portant part in such industries as motor truck, farm tractor, airplane and motor car. This company recently offered 100,000 shares of stock to the public, has already 500,000 shares, par value \$10, underwritten and is planning to build passenger cars embodying its device, that is, the fuel vaporizer, and other inventions covered by Deppe patents. In addition, the Deppe corporation intends to take stock interest in established concerns manufacturing engines for trucks, tractors, cars and airplanes, where these companies will incorporate the Deppe invention in their products on a royalty basis.

Recent tests of the Deppe generator shows that it works very satisfactorily. The generator, by using a small part of the engine exhaust gases, makes super-heated gas of fuel oils.

Property of the Deppe corporation consists of \$1,500,000 in cash and its patents, four of which have been granted already, and a number of others are pending. The Deppe corporation was organized early this year to manufacture Deppe super-heated gas generators and engines under various patents now held by W. P. Deppe of this city.

UNDERGROUND GARAGE PLANNED

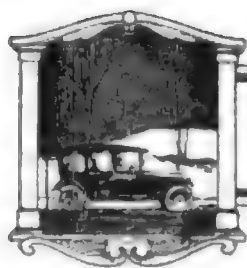
Chicago, March 26—In view of the problem motorists will face when the new downtown anti-parking ordinance goes into effect, there has been a distinct revival of the project for an underground public garage in Grant Park, which is on the lake front just off the congested district. W. O. Duntley, president of the Chicago Pneumatic Tool Co., is one of the strong supporters of the plan, as is Judge Sabbath, formerly of the speeder's court. A definite location of an area, large enough to take care of all machines used down-town for years to come, has been pointed out.

WRIGHT AIRPLANE PLANT SOLD

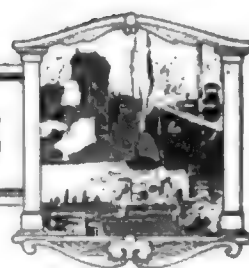
Dayton, Ohio, March 27—The plant of the Wright-Martin Aeroplane Co. has been sold to the Darling Motor Co., a new concern which will use it for the manufacture of motor cars. The Wright-Martin Co. is moving its equipment to its plant in New York.

Work on dismantling the Wright-Martin machinery is in progress, and it is expected that deliveries on the Darling car will begin within the next 60 days.

The new car, which is the design of James Guthrie has a single chassis type but several body styles. These are straight-line effect with double cowl. The chassis comprises a 3½ by 5½ model 7-II Continental six engine, Timken axles, spiral-bevel drive, Borg & Beck disk clutch, Stromberg carburetor, Bijur starting and lighting, Kellogg tire pump, Atwater Kent ignition, Stewart vacuum feed and Moto-Meter, Comphore lenses, demountable wire wheels and other features of equal grade.



EDITORIAL PERSPECTIVES



Decoration Day Racing

THE Indianapolis speedway has spoken early and definitely as to modifications in its racing program for this year because of the war. We agree with them in that if our country is in war and it is impossible to see otherwise, then there should not be any motor racing on Decoration Day. Decoration Day belongs to the soldiers, and if war is on at that time the day unquestionably would be given over to more patriotic matters. We do not see why a Decoration Day speedway race should be held on any speedway this year.

OUR speedways can in most cases be utilized for military uses. For example, Brooklands speedway in England has been used as an aviation field and also as a motor truck testing ground. Our speedways may be used in similar ways, or if not, they would prove admirable places for military pageants for such times as Decoration Day, July 4, etc. Our racing drivers may be needed very much for staff cars, as they were in France in July, 1914. At any rate there is reason why Decoration Day should see no races.

Wardrobe Trunk Tool Box

THERE is no rational reason why the tool box on your motor car should be such a disorganized receptacle. It is worse than the coat pockets of an impossible business man and immeasurably worse than the hand purse of a woman. The majority of tool boxes are simply impossible spaces into which everything goes promiscuously. This is exactly what a tool box should not be. A tool box should be the final word in organization, in order, in convenience, in neatness and in accessibility.

■ ■

THE multiple tool box is what is needed. The tool box with a little design to it and bearing a few resemblances to a wardrobe trunk in that there has been an attempt to have a special place for a few things. The multiple tool box might bear a little resemblance to the up-to-date hotel dresser drawer which has special compartments for shirts, for collars, for handkerchiefs and in a top drawer has compartments for milady's jewels, gloves, etc.

■ ■

IT boils down to our asking for a sensible tool box. Make it so that the top and perhaps the front side are hinged. The box proper might consist of a series of drawers; there can be three or four of them. One of these should have compartments for extra headlight bulbs, spare spark plugs and other spares

that should be handled with care. Another drawer should be given up entirely to an orderly arrangement of tools, pliers, wrenches, screw drivers, hammers, files and the other dozen of little tools that are needed around a car when the owner drives it. Lastly you can have a space or a compartment for miscellaneous parts, waste and other things. We do not attempt to analyze into the final details everything that should be had in this wardrobe box but rather to draw attention to the real need for such and to briefly outline a possible scheme to follow.

■ ■

WE are not in favor of carrying tire tools in the same space with other tools. Give them a separate space. Tire tools are bulky and often dirty. When you need them you should not have to interfere with the regular arrangement of your regular tool box. Tire tools should be carried in a most convenient place. When you want them you want them in a hurry. You are always behind your touring schedule when you need them and so the more reason to have them in a super-convenient place. With them you may require a special hammer and wrench as well as jack, tire pump and perhaps tire tool and chalk. Keep them in one place. You will find it better for your patience and also better for the other tools which should be kept as bright and clean as knives and forks for the dinner table.

The Crankcase Lubricant

ONE engineer who has been making distillation tests of lubricant taken from the crankcases of motor cars and motor trucks has discovered that 45 per cent of the supposed oil in the crankcase has been nothing more or less than gasoline and that not more than 37 per cent of the crankcase contents is really oil suitable for the pistons and rings. This situation presents a serious condition of affairs. The test figures cannot be denied; in fact, they were checked by a government chemist to make sure that there was such a quantity of gasoline getting into the crankcase oil. As a result of this it becomes necessary to change the oil in motor cars and motor trucks much more frequently than formerly.

■ ■

THE trouble for this condition must not be laid up to the fuel makers, for they are doing everything in their power to give us a good satisfactory motor fuel. They can give higher gravity fuels, but if they do the amount of gasoline that you can get from a gallon of crude oil will be cut down considerably, and naturally the price will go up. The gasoline makers have for years worked on the theory that it will be necessary to lower the gravity but at the same time put into the gasoline sufficient highly volatile contents as to make it possible to take up the

spark for ignition and starting. Lately we are facing more fuel trouble, particularly in the cold weather. To add to this are other difficulties such as possibly greater leaking of fuel into the crank-case due to more loosely fitting aluminum alloy pistons.

■ ■

THE solution does not lie along any particular line. We cannot say to the fuel maker "Give us a better fuel so that none of it will condense and leak past the piston rings into the crankcase." We could not get enough of such fuel. We cannot say to the carburetor makers "You must immediately give a carburetor that will make such condensation impossible." If the carburetor maker would give us enough heat perhaps to handle the fuel as it should be handled, then the volumetric efficiency of the engine would be cut down and horsepower reduced. If we said to the makers of engines that reciprocating parts must fit so tightly that leaking past the piston must cease we would meet with troubles.

■ ■

IN the meantime it is best for the car owner and the truck owner to change the oil as recommended. It may sound a little costly and prove a little troublesome, but for today it is the best and the cheapest method.

Motoring Possibilities

Motor Age's

Practical Touring Issue

NEXT WEEK Motor Age's annual touring issue appears. This issue has been called The Practical Touring Issue. It will contain, we state conservatively, more practical common-sense touring information for the car owner than any single issue of any other similar publication ever published.

* * *

IT WILL be in every sense a national touring issue—not a touring issue for the people who live in large cities, Chicago, Kansas City, St. Louis, Milwaukee, New York, Boston and a few others, but a practical touring issue for the motorist in Mattoon, Ill., in Salina, Kan., or in Guthrie, Okla.

* * *

FOLLOWING its custom of the last two years, Motor Age will have a large supplement map showing national highways in colors. This map will contain many additional highways as compared with last year. Several thousand letters have been written to out-of-the-way places, getting road information from the people who live in such sections. This has been incorporated in the map, making it, we think, one of the finest touring maps of the country that has ever been published.

* * *

THESE are days when with the war cloud hanging over us a greater national importance attaches to all maps of this caliber. These are days when the motor truck and the car are dominating factors in case of hostilities. Europe spent on an average of \$12.50 a soldier for guns and ammunition for him, but she has spent more than \$25 a soldier for motor trucks. It may be that America will have to spend as much as \$75 a soldier for motor trucks when we find ourselves in military difficulties and with large problems on our hands. Roads are the great essentials at such times.

* * *

IN ADDITION to this large map there will be sixteen full pages of maps showing different sections of the country with all their leading motor roads. These maps will be in colors, with the main roads specially conspicuous. With these section maps before him the reader, whether he lives in Texas, Maine, Georgia or Nevada, can lay out routes in his home territory, as well as routes to any other part of the country. The motorist who wishes to plan a holiday of two, three or

four days over such holiday seasons as Decoration Day, July 4 or Labor Day can, with the aid of these maps, make such plans. With the aid of these maps he can plan a score of week-end trips in his own, or scores of other localities. These sixteen pages of colored maps, showing all sections of the country, will prove invaluable as a work of reference for the entire touring season.

* * *

THESE maps will prove invaluable for military use, showing as they do at a glance the road situation of the entire country, brought into less space than it has ever been done before. Roads are of more concern to all of us today than they ever were before. Roads will mean more to us for the next year or two, or three, than they have in the past. Each year finds our highways playing a greater role in the development of the country, and with war this situation would be increased severalfold.

* * *

HOW Italy has built roads on the Italian-Austrian frontier since the opening of the war is a special article from our European war correspondent, W. F. Bradley, who spent six months driving an ambulance on the Italian frontier, operating for much of that time out of the captured city of Gorizia. Mr. Bradley had for many months the best opportunity of observing just how roads were built. He took many photographs. These have been passed by the Italian censor and will be reproduced in Motor Age next week. He tells this road story in that same attractive style in which he tells of ambulance work on this front in Motor Age of last week and this week.

* * *

CAMPING and touring facilities do much to add to the pleasure of a trip. Next week Motor Age will describe and illustrate literally a host of devices and apparatus specially designed for the motorist with the object of making touring much easier, and with the object of making his or her trips more pleasant. Outdoor life in the motor car has increased the earning capacity of our business men many hundreds of millions a year, but you can add many hours to this outdoor motoring by camping equipment, cooking utensils and other apparatus that makes it possible to enjoy still more the great out-of-doors.







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Laws Make Better Roads Possible

Bills That Affect Motor Cars and Highways Are Considered by the Various Legislatures

THAT the cause of good roads is marching onward, and onward with steady progress, is evident from the activity in the various legislatures this year in that respect. Bills immediately affecting the growth of the highway systems of the country and the conduct of motor cars thereon have either been acted on already or are being considered in most of the state lawmaking bodies. Texas will have its first state highway department after July 1. Missouri has provided for a highway commission. And so has North Dakota. New Jersey has created a commission. Delaware was practically assured of one from the first introduction of a bill proposing a commission.

Illinois' governor and good roads conference approved a \$60,000,000 bond issue bill, and it was unanimously reported out of the house committee the 22d of this month. This bond issue bill provides that the issue shall be financed by the receipts from motor vehicle licenses and establishes a general system of road building, stipulating the county seats and chief cities that must be connected by the bond issue roads. Coincident with the approval by the committee of this bill the judiciary committee reported out the bill to increase motor car licenses, practically doubling them by 1920.

On these two pages are advices from the various legislatures of this country and from Ontario. Each contains some one or more examples of advances in the building and maintenance of roads throughout the continent, though some deal more directly with the licensing and regulation of motor vehicles and travel. Other examples of the same nature have appeared in *MOTOR AGE* just recently, and each has the same story to tell, more widespread recognition of the universal use of the motor vehicle and the importance of good roads.

IN TEXAS

Austin, Tex., March 23—The bill creating a state highway department in Texas goes into effect July 1. It carries with its provisions for taxation, according to which commercial vehicles are taxed by the carrying capacity per wheel, from \$20 for between 1000 and 2000 lb. per wheel to \$300 for between 8001 and 10,000 lb., loads greater than 10,000 lb. per wheel causing a charge at the rate of \$500 per each 1000-lb. increase or a fraction thereof, provided no load greater than 800 lb. per inch width of tire per wheel shall be permitted and no vehicle of a total gross

weight of more than 14 tons shall be licensed. Other motor vehicles are taxed at 35 cents a horsepower.

IN MINNESOTA

Minneapolis, Minn., March 23—With the probability of the passage by the Minnesota legislature of a bill making it a misdemeanor to steal or borrow a car without the owner's consent, the action of the Hennepin county judges is likely to stop widespread thievery. Judge H. D. Dickinson has just sentenced a man to from one to ten years in the state prison for taking a car. Grand larceny in the first degree was the charge.

A bill has been introduced into the legislature providing for a commissioner of highways to be appointed by the governor at a yearly salary of \$4,500 for six years. He will replace the state highway commission. The bill provides for an optional road tax, not more than 10 mills.

IN CONNECTICUT

Hartford, Conn., March 23—Just what the Connecticut legislature now in session will do with the motor car law is of particular interest to dealers, because they believe pro rata registration fees after April 1 tend to discourage winter buying. The one big question insofar as the dealers are concerned at present is the modification of the law which will permit a dealer to use his car to go home to dinner or take his family out or do any of those things not actually covered by the law which states a car under a dealer's license shall be used only for actual demonstrations, testing or adjustments. The committee on roads, rivers and bridges, to whom the law has been referred, gave a hearing last week.

Provided two bills pending before the state legislature pass, all railroad crossings in the state will be protected by danger signals at night. One bill calls for some sort of signal to warn motorists of the proximity of a crossing, while the other calls for a lighted sign bearing the word "stop." It is expected the measures will go through.

COLORADO'S LIEN LAW

Denver, Colo., March 23—A bill for a lien law to protect all branches of the motor car business in Colorado has been introduced in the state legislature. The measure provides for a lien on all kinds of motor vehicles to apply to charges for storage, maintenance, keep or repair and for supplies, accessories, parts, gasoline or elec-

tricity and labor. The proposed lien is to be binding for a period of thirty days from delivery date, without filing or giving any notice, but the claimant must file a specified form of lien with county clerk and recorder to make a lien claim effective longer. Where lien is filed and claim collected, proper notice of settlement also must be filed with the clerk and recorder. Exemption is provided for innocent purchasers or mortgagees, where purchases or mortgage is made in good faith and without notice of such lien, but a penalty of \$25 to \$100 fine or imprisonment for thirty to sixty days is provided against an owner for selling or mortgaging a lien-bound car within the first thirty-day lien period without duly notifying the purchaser or mortgagee of the lien claim.

IN KANSAS AND MISSOURI

Kansas City, Mo., March 23—Missouri and Kansas have both passed new road laws during the recent sessions of their legislatures, and work under them is already starting.

Missouri has made longer steps forward toward good roads than ever in her history. One of them provides for a highway commission of four men, who will select trained road engineers to take charge of the building of 3500 miles of highways in the next five years. Money for these roads is to be obtained from the counties and federal funds, and it is expected that \$12,000,000 will be available for the purpose in the period. The commissioners are: C. O. Raine, Canton; George E. McInich, St. Joseph; E. L. Sanford, Springfield; A. E. McKibbin, St. Louis. The new law abolishes the office of highway commissioner, held by Frank W. Buffum.

The Kansas legislature also created a highway commission which, with the governor, will select highway engineers to plan and supervise the construction of roads; as well as a bridge bill under which the highway commission may exercise supervision over the kind of bridges built by counties and a new license law, so that \$4.50 of the \$5 fee goes to the counties and townships where the motor cars are owned.

IN ONTARIO

Toronto, Ont., March 23—Increase in the speed limit, regulation of headlights to eliminate glares and the licensing, without examination, of all drivers are among the more important amendments to the motor vehicle act which the Ontario Motor League will endeavor to obtain at the pres-

ent session of the Ontario legislature. A bill providing for the carrying of lights at night by all vehicles also will be introduced. That the present speed limit of 20 m.p.h. in the country and 15 m.p.h. in the city has remained long enough is the unanimous opinion of the board of directors.

An amendment to permit a speed limit of 20 m.p.h. in cities, towns and villages and 25 m.p.h. in the open country will be asked. The Province of Quebec recently increased the speed limit to 25 m.p.h. in the country and 20 m.p.h. in cities, towns and villages.

IN DELAWARE

Wilmington, Del., March 24—The Delaware legislature, having practically decided to create a state highway department with authority to take over the public roads, reconstruct and maintain them and build and keep up new ones, is wrestling with the problem of raising additional revenue for the State, as the highway bill will give the highway department the fees. The aggregate of these fees last year was about \$65,000; this year it will exceed \$100,000.

Warning lights are not necessary on vehicles using Delaware roads at night, except on motor cars, according to the judgment of the Delaware State Senate, which a few days ago killed a bill to require all vehicles using the roads at night to carry white lights.

ARIZONA AGITATES GOOD ROADS

Phoenix, Ariz., March 23—That Arizona is going in for good roads, and going in strong, is shown by the attention paid to the subject of highway building and maintenance, motor vehicle traffic, etc., by the state legislature now in session. One of the most important measures pending in the legislature would provide an annual road fund of about \$500,000 for good roads. Twenty-five per cent would be expended by the state and 75 per cent by the counties. The bill would raise this amount annually by a special good roads tax of 10 cents on each \$100 assessed valuation.

In addition to the state road tax bill there are many road and bridge bills calling for \$200,000 for bridges on the state highways. All the bridges proposed are on the main traveled tourist routes, and it is probable that practically all will be built during the coming summer. There is a wide tire bill prohibiting any tires less than 2 in. in width on vehicles other than rubber-tired vehicles.

GOETHALS TO NEW JERSEY?

Trenton, N. J., March 24—New Jersey is trying to get a bridge over the Delaware at Philadelphia and a tunnel or bridge across the Hudson into New York for motor traffic, as well as the road improvement work, Governor Edge is making an effort to obtain the services of Gen. George W. Goethals of Panama Canal fame as consulting

engineer on this work. It is said that General Goethals is willing to accept, and a bill has been introduced into the Legislature to make provision to employ him.

The new highway bills creating a commission to build and improve roads and authorizing the expenditure of \$15,000,000 in five years on this work have been passed and the commission consists of Col. A. R. Kuser, Bernardsville; John W. Herbert, Helmetta; George W. F. Gaunt, Mullica Hill; Col. Edwin A. Steven, present state highway commissioner, Hoboken; Watson G. Clark, Tenafly; Walter J. Bubzy, Atlantic City; Ira A. Kipp, Jr., South Orange and George E. Blakenlee, Jersey City.

The \$15,000,000 for road improvement will be raised by a special road tax of 1 mill on all real and personal property in the state. This new road act supersedes the Egan act which was endorsed by the voters last fall and which would have spent but \$7,000,000, this to be obtained by a bond issue and paid for out of motor vehicle licenses, fees and fines. The new law leaves the \$1,500,000 annual income of the motor vehicle department to be spent, as formerly, on upkeep of state roads.

IN PENNSYLVANIA

York, Pa., March 23—More than the usual amount of legislation of interest to the motorist is making its appearance at the session of the Pennsylvania state legislature. Several proposed amendments to the license laws have been introduced in the house by Representative Mearkle of Allegheny county. They limit the size of motor vehicles to 90 in. outside width, except buses, which can be 100 in.; exempt from payment of fees fire apparatus, police and hospital vehicles; make alterations of tags a misdemeanor; provide revocation of licenses for improper conduct; require reflectors and dimmers; limit searchlights to left-hand side; require all informations to be under state laws; fix fines for drivers taking part in road races and extend powers of constables to agents of the state highway department. The age limit is raised from sixteen to eighteen years, but no change is made in license fees.

IN NORTH DAKOTA

Bismarck, N. D., March 24—Horsepower basis for motor car taxation in lieu of other taxation and the privilege of the state coming under the provisions of the federal good roads aid act are features of the new highway act. All cars are to be assessed at \$6 each and those with more than 20 hp. will pay 50 cents for each additional power, an owner of a 40-hp. car paying \$16. This will replace the personal property tax.

The act provides a state highway commission and contemplates expenditure of 90 per cent of the receipts from registration within the county in which the tax originates. This is an addition of 15 per cent over the old law. Owners will pay their first taxation under the new law Jan.

1, 1918. For 1917 the receipts will be divided on the same basis as under the new law. A senate bill provides a penalty for larceny of motor cars and motorcycles.

OHIO ROAD LAW UNANIMOUS

Columbus, Ohio, March 24—The action by the general assembly on the White-Mulcahy bill, which passed the house recently by a vote of 101 to 0 and the senate by a vote of 31 to 0 presents a record in the history of road legislation.

The Cass law, enacted two years ago, possesses many excellent features and in the main has been preserved, but the White-Mulcahy bill is designed to correct the errors and supply the omissions in the present law, and greater harmony and efficiency must follow. The bonding sections have been simplified; bids on unit price basis on contracts have been provided for; and aid is given poor municipalities that gaps may be filled in between ends of present improvements that stop at corporation lines. The title "county highway superintendent" has been abandoned, and the office hereafter will be known as that of county surveyor.

The new law provides for establishing a highway advisory board for the state highway department, which will consist of four members, no two of whom may reside in the same county and not more than two of whom may be of the same political party. According to this section the state highway commissioner must receive the approval of the highway advisory board in matters of general policy, particularly with reference to changes in the state system and negotiations for road improvement with the Federal government.

CARRY CHILDREN FROM ROAD

Little Rock, Ark., March 23—Some interesting provisions are contained in a new motor car regulatory bill introduced into the Arkansas legislature. One of them is that if a pedestrian fails to heed the warning of a motorist, the latter must stop and wait until the person walking has gotten completely out of danger; and in case the pedestrian is under the age of 12, the motorist must remove the child to a place of safety before proceeding. Failure to comply with this requirement is only a misdemeanor, it is strange to say, and is punishable by a fine of from \$5 to \$25.

A tax of \$6 for every 20 hp. or fraction thereof is fixed and the sheriff is allowed 50 cents for collection. The speed limit in towns and cities and crowded thoroughfares is 10 m.p.h. and 5 m.p.h. around corners. Physicians are exempt.

ARIZONA ROAD LEVY INCREASED

Phoenix, Ariz., March 23—Arizona will have about \$575,000 in the state road fund this year as a result of the passage by the legislature of the bill levying 10 cents on each \$100 valuation for the state road fund. The new law will almost double the present levy for good roads.



Standardizing Traffic Rules

Every City on Yellowstone Trail to Have Uniform System of Regulations

RECENTLY a man who has given considerable study to traffic regulations as they affect headlights gave utterance to the expression that a motorist crossing the continent on a particular transcontinental highway would be required to change his headlights eighteen times if he adhered to the law of every city through which he passed. How long is such a condition to be tolerated? Are the motorists going to sit idly by and let every town, city

and village regulate the passage of cars through their limits with utter disregard for uniformity and raise no voice in protest?

The day has come when the touring horizon has broadened to such an extent that our highways are carrying a volume of traffic unprecedented. With the increasing volume of motor cars moving over our roads and through our cities, the need for regulation becomes more and more impera-

tive. Too many cities plunge blindly into the question of formulating rules, disregarding completely the rules in force in the other cities to which they are bound by the highway. There should be a greater spirit of co-operation among cities to the end that the traffic ordinances, so far as possible, be uniform. Imagine trying to operate railroad trains with a train dispatcher in every station along the road, who took no cognizance of what the dis-

Cities on Yellowstone Trail West of Chicago and Their Population

ILLINOIS				SOUTH DAKOTA				Town	Population	Town	Population
Town	Population	Town	Population	Town	Population	Town	Population	Lockwood ..		Belgrade ..	1,000
Chicago ..	2,185,283	Lake Forest.	3,349	Big Stone C.	551	Beebe		Billings ...	15,000	Manhattan ..	800
Evanston ..	24,978	Waukegan ..	16,069	Nubia		Roscoe	357	Yegen		Logan	200
Wilmette ..	4,943	Zion City...	4,789	Milbank ...	2,015	Gretna		Laurel	800	Three Forks	1,500
Highland Pk	4,209			Twin Brooks	150	Bowdle	750	Park City..	500	Sappington ..	100
WISCONSIN				Marvin	150	Java	473	Youngs Pt..		Whitehall ..	600
Kenosha ...	21,371	Melladore ..	475	Summit ...	545	Selby	558	Rapids		Butte	60,000
Racine	38,002	Auburndale..	297	Ortley	150	Sitka		Columbus ..	1,000	Anaconda ..	
S.Milwaukee	6,092	Marshfield ..	5,783	Waubay ...	803	Glenham ..	182	Merrill	100	Deer Lodge ..	3,800
Milwaukee ..	373,857	Spencer	852	Webster ...	1,713	Mobridge ..	1,500	Reeds Point		Garrison ...	
Richfield ...	475	Unity	363	Holmquist ..		Moreau Jun.	70	Quebec		Gold Creek ..	
Schleisinger-		Colby	869	Bristol	444	McLaughlin.	200	Big Timber.	1,200	Drummond ..	
ville	522	Abbotsford ..	947	Andover ...	446	Tatanka ...		Hunters Hot		Bearmouth ..	
Addison ...	500	Owen	745	Groton	1,108	McIntosh ..	800	Springs...		Nimrod	
Theresa	145	Withee	443	James	100	Watauga ..	100	Livingston .	5,500	Clinton	
Lomra	529	Thorp	741	Bath	100	Morristown .	400	Chico Hot		Missoula ...	12,000
Fond du Lac	18,797	Stanley	2,675	Aberdeen ..	14,000	Keldron ...		Springs...		Alberton ...	100
Van Dyne..	150	Cadott	765	Mina	100	Thunder ...		Corwin Hot		Superior ...	150
Oshkosh ...	33,062	Chippewa F.	8,893	Craven		Hawk ...		Springs...		St. Regis...	240
Medina	200	Eau Claire..	18,310	Ipawich	1,000	Lemmon ...	1,255	Gardiner ..	500	DeBorgia ..	125
Dale	575	Menomonie ..	5,036	NORTH DAKOTA				Livingston .	5,000	Saltese	280
Fremont ...	305	Knapp	413	Petrel	25	Seranton ..	214	Bozeman ..	8,000		
Weyauwega.	967	Wilson	500	White Butte	150	Bowman ...	1,000	IDAHO			
Waupaca ...	2,789	Baldwin	584	Haynes	150	Griffin		Mullan	1,667	Coeur d'	
Sheridan ...	193	Hammond ...	408	Hettinger ..	1,100	Rhame	100	Wallace ...	3,000	Alene ...	7,291
Amherst ...	629	Roberts	375	Bueyrus ...	100	Marmarth ..	1,050	Kellogg ...	1,273		
Stevens Pt..	8,692	Hudson	2,810	Reeder	198	Montline ..	50	WASHINGTON			
Junet. City.	525			Gascoyne ..	100			Spokane ...	104,402	Prosser	1,298
MINNESOTA				MONTANA				Spangle ...	299	Grandview ..	320
St. Paul....	214,744	Hector	866	Dodge	100	Joppa		Plaza	97	Sunnyside ..	1,379
Minneapolis	350,000	Bird Island.	931	Kingmont ..		Rosebud ...	500	Rosalie	767	Outlook ...	250
Hopkins ...	1,000	Olivia	900	Baker	600	Forsyth ...	900	Thornton ..	400	Granger ...	450
Minnetonka		Danube	217	Townquin ..		Howard ...		Culfax	2,783	Toppenish ..	1,598
Mills		Renville ...	1,182	Plevna	200	Finch		Pomeroy ...	1,605	Zillah	250
Deephaven .	100	Sac'd Heart	587	Westmore ..		Sanders ...		Dayton	2,389	N. Yakima ..	14,082
Excelsior ..	1,015	Minnesota F.		Ismay	400	Hysham ...	200	Huntsville ..	100	Selah	350
Victoria ...		Granite F...	1,451	Mildred ...	250	Myers		Waitsburg .	1,237	Ellensburg ..	4,209
Waconia ...	817	Wegdahl ..	100	Fallon	500	Big Horn...		Walla Walla	19,364	Cle Elum...	2,749
Y. America .	303	Montevideo.	3,056	Terry	1,000	Custer	400	Touchet ...	250	Roslyn	3,126
Norwood ...	522	Watson	150	Blanchford .		Waco		Wallula ...	160	Ronald	
Plato	110	Milan	468	Sherley		Bull Mount.		Attalia	200	Easton	58
Glencoe ...	1,788	Appleton ..	1,221	Tusler		Pompey's ..		Two Rivers.	50	North Bend.	300
Sumter	100	Correl	120	Miles City..	7,000	Pillar ...		Pasco	2,083	Snoqualmie .	279
Brownston ..	500	Odessa	200	Fort Keogh.		Newton ...		Kenewick ..	1,219	Fall City...	400
Stewart ...	412	Ortonville .	1,774	Horton		Worden		Benton City		Seattle	237,194
Buffalo Lake	371			Clermont ...		Osborn		Richland ..	350	Tacoma	83,743
				Hatheway ..		Huntley ...	400	Kiona	175		

Total distance, 2567 miles.

patcher on each side of him had ordered or was about to order. Would we ever get anywhere, or would our travels be clothed with any degree of safety under such a regime? You may say that the parallel is far-fetched, but is it? Liken the traffic officer, who is not to be blamed if he is carrying out the letter of the law as put on the statute books of the city that employs him, to the train dispatcher and think of every car as a train. The traffic officer is the court of last appeal, the director of traffic. If he signals with a blast of a whistle or a movement of the arm who knows what that signal means? A swing of the arm or a lantern on the railroad, the position of the semaphore, has a distinct meaning that holds good everywhere. Why not have our signals that mean so much for the safe movement of traffic in our streets uniform?

We have looked into the matter of trans-continental touring very carefully and know that the main cross-country trails carry a great volume of travel and these tourists are in the dark as to what rule or regulation they must obey when they reach the limits of a town. This brought to mind the thought that standardizing traffic rules by trails would redound to the credit of the trail and at the same time promote the doctrine of safety to a much greater extent.

We have chosen the Yellowstone trail as a fertile field for beginning this concentrated campaign for uniform traffic rules. West of Chicago the Yellowstone trail stretches up through Wisconsin, out across Minnesota and the Dakota prairies, through Montana, a part of Idaho and across Washington. The total mileage from Chicago to Tacoma is 2567 and in that distance one passes through 249 cities, towns and villages. The tourist passes through one town every 10 miles on an average.

Reason for Campaign

It is to combat this situation, to put the officials and all people in general in a more charitable frame of mind toward the tourist that MOTOR AGE has launched a campaign of education as to the needs of traffic regulations. It has not picked the Yellowstone trail as being any more in need of uniform regulations than any other cross-country highway. Ultimately other roads will be taken into the campaign, but we can see where, when the object of the campaign has been brought to a successful culmination—and we have every reason to believe it will be successful in view of the support being given by people all along the road—it will be something of which the Yellowstone can be proud to say that every city and town through which it passes has the same fundamental principles underlying the traffic regulations under which tourists over that highway will move.

CHALMERS IN HIGH GEAR TEST

Chicago, March 27—A Chalmers seven-passenger 6-30 as a part of its 24-hr. non-

motor stop test under A.A.A. rules grid-ironed the Chicago loop this morning in one hour, which means that it covered the six streets running lengthwise in the loop and the eight cross streets, for ninety-six blocks, making thirty traffic stops in that time.

The car with four passengers started the test yesterday at 12.20 p. m. and was driven continuously through the parks and over the boulevard system and much of the time on streets having street car tracks. When the car was brought to a halt at 12.20 the speedometer showed 586.8 miles, or an average of slightly over 25 m.p.h.

Both the low and intermediate gears were removed from the gearset, which left only high and reverse, and the run was made on 42 gal. of gasoline, showing an economy in fuel of 14 m.p.g. Six quarts of oil were used and 2 gal., 3 pts. of water. The test was in charge of L. A. Hillman, A.A.A. representative, and two drivers worked in 8-hr. shifts. Forty-seven minutes were lost in stops for various reasons other than traffic stops. The weight of the car with four passengers was 3815 lbs. In a similar test run in New York recently, the mileage was 358.7. There was no tire or mechanical trouble experienced during the test. Immediately following the test, the car was taken to the speedway for a time trial to determine the effect the 24-hr. grind had on the clutch.

HAVE USED CAR SHOW WEEK

Detroit, March 26—Some of Detroit's largest motor car sales representatives are arranging for an exchanged car week, giving buyers an opportunity to obtain bargains in cars exchanged for new models. The companies interested are the Packard Motor Car Co., Detroit Electric Car Co., Bemb-Robinson Co., Hudson distributor, M. A. Young, Reo distributor, Grasser Motor Sales Co., Hupmobile distributor, Devlin Co., Haynes distributor, and Wetmore-Quinn Co.

110,000 CARS BEHIND

Detroit, March 26—The Ford Motor Co. is 110,000 cars behind its present orders. The company plans the production of the Ford truck sometime in the near future but since it is unable now to produce Ford cars in equal quantities with the demand has put the truck problem to one side temporarily. The company is erecting another plant to augment the present one and probably will be able to meet the demand for its product when this is completed.

HARROUN PRODUCTION SOON

Detroit, March 24—The first of the machinery for the Harroun Motor Corp. plant has been installed. The floors of the manufacturing and assembly buildings have been laid, and as rapidly as these harden the machinery is going into the plant. The floors are being laid from the ends of the T-shaped building, laid out toward the center, and the machinery is

following this up as rapidly as the floors harden enough to form a substantial base. If the weather continues mild manufacturing will probably be under way within the next few weeks, as practically all the machinery is on hand and stored within a few hundred yards of the manufacturing and assembly plant.

MID-WEST TO TALK FUELS

Chicago, March 26—Present-day motor car fuel and how they can best be handled will be the subject of the symposium at the next meeting of the Mid-West Section, S. A. E. at Chicago Automobile Club April 14. Information on available fuels for the next few years will be given by Dr. Burton, vice-president of Standard Oil Co. of Indiana. Discussion on the carburetor man's problem will be lead by F. C. Mock, chief engineer of the Stromberg company, and the engine designs for using these fuels will be discussed by H. L. Horning, general manager Waukesha Motor Co.

FORD WINS BEFORE COMMITTEE

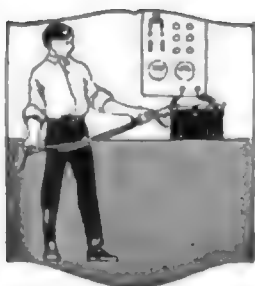
Lansing, Mich., March 23—Henry Ford has won another round in his controversy with Dodge Bros. The senate committee of banks and corporations yesterday decided to report out the bill, which is known as the Dodge-Ford bill, with but one amendment. Instead of making the sky the limit for corporations in the state as the bill asked for, the limit has been placed at \$75,000,000. The amendments which Dodge Bros. sought to have in the bill, providing that a minority stockholder could upset the entire framework of the corporation, were refused by the committee.

PATHFINDER RECAPITALIZED

Indianapolis, Ind., March 23—The Pathfinder Co. has consummated a deal by which it has recapitalized for \$5,000,000 and will greatly enlarge its plant and capacity. The A. R. Scheffer Co., New York and Detroit, broker, has underwritten all the stock, which comprises \$3,000,000 common and \$2,000,000 preferred and will place it on the market. The officers of the company will retain their executive positions. This deal disposes of the rumor at the New York show, when it was stated that the Pathfinder company would merge with another Indianapolis motor car concern. Officials of the company state that such a plan was under consideration but was not accepted.

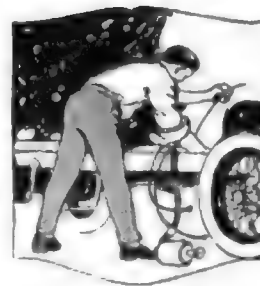
NEW VAN SICKLEN CONTRACTS

Chicago, March 26—The Van Sicklen Co. reports that new contracts for speedometer equipment has been made with the Grant Motor Car Co., Cleveland, Ohio; Velle Motors Corp., Moline, Ill.; Stephens Motors, Freeport, Ill.; Moon Motor Car Co., St. Louis, Mo.; Emerson Motor Co., Kingston, N. Y.; Rock Falls Mfg. Co., Sterling, Ill.; Piedmont Motor Car Co., Lynchburg, Va.



Electrical Equipment of the Motor Car

By David Penn Moreton & Darwin & Hatch.



Editor's Note—Herewith is presented the thirty-seventh installment of a weekly series of articles begun in *MOTOR AGE* issue of June 29, designed to give the motorist the knowledge necessary to enable him to care for and repair any and all of the electrical features of his car, no matter what make or model it may be. At the conclusion of this series, "Electrical Equipment of the Motor Car," with additions, will be published in book form by the Class Journal Co., Chicago, in a size to fit the pocket conveniently.

The fundamentals of electrical circuits of the motor car were explained through their analogy to water systems, and the relations of current pressure and resistance were brought out. This was followed by an explanation of series and multiple circuits, how electricity is made to do work in lighting, starting, signalling, etc. Calculating the capacity of a battery for starting and lighting and the cost of charging storage batteries and determining the torque a starting motor must develop were explained. Action of primary batteries and dry cells was considered. A section was devoted to the makeup and action of lead and Edison storage batteries, and another to the care of lead batteries in service and the best methods of charging them. Magnets and electromagnetism then were considered, and the principles of generators and motors were explained. A section on generator output was followed by one on the purpose and operation of the cutout. The section on Engine and Motor Connection began March 1 and was preceded by one on Electric Motors.

Part XXXVII—Motor and Engine Connection—Drives for Generator

THE function of the generator is to provide a suitable means of charging the storage battery while it is installed on the motor car, thus keeping the battery practically completely charged at all times so that an ample supply of energy is always available for operating the starting motor, lamps, horn and other electrical devices which may be installed originally on the car. In no case should additional electrical equipment be installed upon any car unless you are reasonably sure the capacity of the storage battery is ample to take care of the additional load and at the same time the capacity of the generator is sufficient to keep the battery charged under normal operating conditions.

The generator will not start to charge the storage battery until the electrical pressure generated in its armature is greater in value than the electrical pressure of the battery. The electrical pressure generated in the armature winding of the generator depends on the speed at which the generator is driven, and it will vary directly as the speed at which the armature is revolved if all the other quantities on which the pressure depends, such as the strength of the magnetic field of the machine, etc., remain

constant in value. It is obvious, since the electrical pressure in the armature of the generator depends on the speed, that the battery would discharge back through the generator, if they were permanently connected together, when the speed of the generator happened to be of such a value that the electrical pressure of the generator was less than the pressure of the battery. The function of the cutout is to provide a means of disconnecting the battery from the generator when the battery starts to discharge back through the generator. As explained in one of the previous chapters, these cutouts assume several different forms, some being operated electrically and some by hand.

In order that the electrical pressure in the armature winding of the generator may increase in value as the engine speeds up and the generator starts charging the battery, it is necessary that some mechanical connection be established between the crankshaft of the engine and the armature shaft of the generator. The requirements of this connection are quite different from those imposed on the mechanical connection between the starting motor and the crankshaft of the engine. First of all, the torque required to drive the generator when it is delivering its rated or normal full load will be nothing like as great as the torque the starting motor must develop when it is turning the engine over in starting; hence, the mechanical strains to which the generator connections are subjected will as a rule be less than those imposed on the motor connections. Second, the design and operation of the motor connection in the majority of cases must be such that the motor will be disconnected from the engine crankshaft when the engine starts to fire either automatically or by some manual means. No such requirements need be met in the case of the generator connection, and they are connected in almost every case permanently to the crankshaft of the engine. In some cases, such as in the installation of the Deleo dynamotor, a double mechanical connection is provided, but their construction is such that only one of them is operative at any one time as will be explained later. Third, the ratio between the speed of the generator shaft and the crankshaft of the engine, except in the case of dynamotors with a single drive, is quite different from the ratio between the speed of the motor shaft and the crankshaft of the engine. This difference is due chiefly to the fact that the generator will be connected to the engine all the time and, of

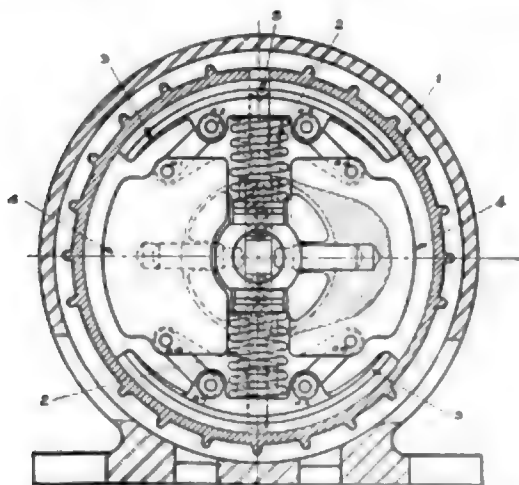


Fig. 220—Sectional view of one form of Gray & Davis friction drive, perpendicular to armature shaft

course, will have to operate under a wider total variation in engine speed than the starting motor.

If the same relation between engine and generator speed were provided as in the case of the motor, the speed of the generator would exceed the allowable limit, and it would be almost impossible to construct an armature and commutator that would withstand continuously the enormous centrifugal forces that would exist at these very high speeds. In the connection of a dynamotor to the engine by a single drive, the gear ratio will have to be lower than the maximum ratio with a double drive to keep the maximum speed down. Fourth, in some cases the ignition distributor is combined with the generator and driven through a gear connection from the generator shaft. In such cases it is absolutely imperative that the position of the distributor arm in relation to the proper firing order of the various cylinders remain fixed at all times, and in such cases it is obvious that the connection between the generator and the engine must be very definite.

Generator connections may be divided into the following main groups and a brief description of one or more typical examples of each kind will be given:

Friction drive.

Belt drive.

Chain drive.

Gear drive.

Mounted directly on engine shaft.

Friction Drive for Generator

A sectional view of the friction drive as used by Gray & Davis on their types E and G-1 generators is shown in Fig. 220, and a sectional view parallel to the shaft of the generator is shown in Fig. 221. The cup-shaped piece of metal marked 1 in both figures is connected to the end of the driving shaft. Two friction shoes, marked 3, are connected mechanically to the end of the generator shaft, so that they may move in or out along pins in the end of the shaft, and held against the inside surface of the cup 1 by coiled springs, 2, which are under compression. Two weights, marked 4, are connected mechanically by four links to the friction shoes. These weights may move perpendicularly to the shaft along pins fastened to the shaft which enter holes in the weights. As the speed of the driving shaft increases, the centrifugal force acting on the weights increases, and this action tends to draw the two friction clutches away from the inside surface of the

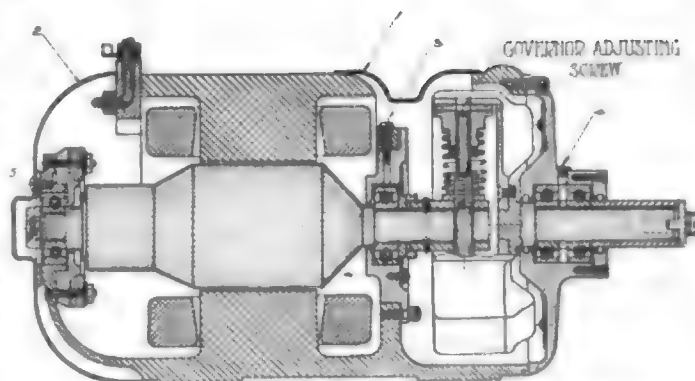


Fig. 221—Sectional view of another form of Gray & Davis friction drive, parallel to armature

cup and thus disconnect the generator shaft from the driving shaft.

The speed of the generator shaft at which the disconnection actually takes place will depend on the adjustment of the two coil springs holding the weights against the inside of the cup. These springs may be adjusted by inserting a small screw driver in the opening 5. When the maximum current output of the generator is to be increased, which amounts to increasing the speed at which the generator shaft is connected from the driving shaft, the screw in the opening 5 should be turned to the right. The governor is very sensitive, and only a slight movement of this adjusting screw is necessary to produce a decided difference in the output of the generator. Just as soon as the speed of the generator decreases a slight amount after the friction shoes are raised from contact with the inside surface of the cup, the centrifugal forces acting on the weights will decrease, and the springs will shove the shoes out against the cup and again establish the mechanical connection between the generator and the driving shaft. The total variation in the speed of the generator, when the speed of the driving shaft exceeds the speed for which the generator is adjusted, does not amount to very much, and as a result the electrical pressure generated in the armature winding will rise to a certain maximum value and then remain practically constant for all higher engine speeds.

The small projections around the outer surface of the cup 1 produce a fan-like action which causes a circulation of air through the generator, thus tending to keep its temperature lower than it would otherwise be.

STUDEBAKER SALESMEN MEET

South Bend, Ind., March 26—Salesmen of the Studebaker corporation throughout the United States, with the exception of those covering the Southern territory, were in the city last week to attend the conference that is held annually at the home office of the corporation. Talks were made by officials of the company, among whom were L. F. Reyer, assistant sales manager; John F. Deacon, sales department; A. C. Hill, sales department; Arthur G. Rumpf, secretary of the corporation; D. O. Paulson, sales department; O. S. Barrett, advertising manager; and Edwin C. Witwer, purchasing department. A banquet Thursday evening closed the activities of the week.

POLICY IS UNCHANGED

Indianapolis, Ind., March 24—Officers of The Wheeler-Schebler Carburetor Co. of Indianapolis and Detroit announced today that the recent action of the company in incorporating in both Indiana and Michigan with a capitalization of \$1,000,-

000 in each state means no change in the policy of the company. The company had operated as a partnership until the incorporation papers were filed, Frank H. Wheeler of this city having been the sole owner of the concern since he bought out the Schebler interests about three years ago. The incorporators of the company are Frank H. Wheeler, president; Douglas Wheeler, his son, vice-president, and Sey-

mour Avery of this city, secretary-treasurer and general manager. The last two officers recently acquired stock in the corporation, having been connected with the company for several years.

AUTO PARTS WINS NAME SUIT

Chicago, March 23—The similarity of names between the Auto Parts Co., and the Auto Sales and Parts Co., both manufacturing jobbers and dealers of Chicago, has resulted in the decision by Judge Charles M. Foell of the Superior Court of Cook County in favor of the Auto Parts Co., perpetually enjoining the Auto Sales & Parts from using a name similar to that of the Auto Parts Co. It also was decreed that the Auto Parts Co. has a right to an accounting to ascertain the damages sustained and the profits lost. It is understood that the Auto Sales and Parts in the future will be known as the Auto Needs Co., this change having been made, it is stated, before the decision was rendered. The Auto Needs Co. has appealed.

A NATIONAL WAR MAP

Next week Motor Age supplement will be in the form of a large map showing in several colors the many national highways of the country and also scores of feeding roads that have been opened or improved in the past year. The map will be one of the most valuable in case of war that could be desired. It will show at a glance the great national highways that would have to be used for moving troops, ammunition, guns, etc.

Further Tire Advances

United States Rubber Co. Cites Increasing Cost of Crude and Fabric

Present Production Is 12,000 Tires a Day

NEW YORK, March 22—Another advance in tire prices is imminent, in fact may come within a month, according to Colonel S. P. Colt, president of the United States Rubber Co. This company is now manufacturing 12,000 tires a day and with the completion of its new additions to the Morgan & Wright plant in Detroit, the capacity will be brought up to 14,000 tires a day. An advance in tire prices is only in line with the steadily advancing cost of crude rubber and fabric.

At the present time the U. S. Rubber Co. can turn out rubber from its own plantations in Sumatra at a cost of 17 cents a pound. The same rubber is selling in the open market at 34 cents a pound.

It has 14,000 employees on its plantation in Sumatra. All but 200 of these receive a salary of 15 cents a day. For the same sort of work in the rubber forests of Brazil workers receive from \$1.50 to \$2 a day. About \$10,000,000 is invested by this company in its far eastern plantation. This includes an original investment of about \$8,000,000 and interest charges of about \$2,000,000.

About 15 per cent of its crude rubber needs will be taken care of this year from its own plantations. This percentage will be increased to 25 per cent in 1918. In 1921 the U. S. Rubber Co. should secure about half of its crude rubber requirements from its own plantations, that is, half of the requirements on the basis of present sales of the company, states Colonel Colt.

PACKARD TRUCKS HIGHER

Detroit, March 24—Packard has raised truck prices, effective to-day. The new prices are: 1-ton, \$2,325; 1½-ton, \$2,600; 2-ton, \$3,000; 3-ton, \$3,600; 4-ton, \$4,025; 5-ton, \$4,550; 6-ton, \$4,800. The increase is caused by the higher cost of materials, which have advanced 128 per cent in some instances.

HAS 78 PER CENT INCREASE

Detroit, March 23—The Packard carriage sales board, in its meeting, reported to the Packard Motor Car Co. that it had an increase in business, from Feb. 15 to March 15, of 78 per cent over the same period in 1916. The board is composed of the sales managers of the Packard branches and dealers, established in nine of the principle cities of the country.

MANSFIELD PLANT FOR HALLADAY

Mansfield, Ohio, March 23—The Halladay Motor Car Co. recently capitalized at \$1,000,000, will locate in this city, taking

over the plant of the Baxter Stove Co. Partial operations will start soon, the entire plant for the manufacture of the Halladay car being moved here from Streator, Ill., where the car has been made by the Barclay Motor Car Co.

The Halladay car at present is produced in three body types and markets at \$1,150 and \$1,385 complete. These cars will be manufactured in this city until Sept. 1, when the 1918 models will be produced.

The incorporators of the company are T. E. Huth, Canton; Y. F. Stewart, Cleveland; G. B. Stacey, Cleveland; J. N. Horne, Warren; and Fred Stanley, Sebring. Mr. Huth is general manager.

More than \$250,000 of the capital stock of the company has been subscribed.

PERRIN-FAW SUIT DISMISSED

New York, March 23—The United States Court of Appeals has fully affirmed the decision of the lower court which dismissed the suit brought by N. J. Quinn on behalf of the Perrin no-glare deflector company against the J. H. Faw, Inc., handling the Lennon light protector. The patent involved was No. 1,099,715, covering the construction of a bulb reflector, half of the bulb being covered by a silver coating. The Faw device is a detachable metal covering, and not a coating upon the glass. The element of adjustability also entered into the question. The decision of the lower court was made last July.

250 COLORADO MARKERS

Denver, Colo., March 24—Placing 250 new official markers this spring along Colorado's 550-mile scenic link of the Pike's Peak Ocean-to-Ocean highway will be part of extensive promotion work provided for by the convention just held in Colorado Springs of the Colorado division of this transcontinental motor route. These markers will be of uniform and attractive design and will give substantial service in clearly directing travel along this picturesque road through the Rockies.

The division organization discarded the "Lincoln Highway Association of Colorado" title and will now use exclusively the name, Colorado Division of the Pike's Peak Ocean-to-Ocean Highway Association. The 1918 convention will be held in January, to gain an earlier start for next year's development plans.

YOUR WEEK-END TOUR

Thousands of motorists puzzle as to where they will go for a week-end tour, Saturday afternoon and all day Sunday. Next week Motor Age's sixteen pages of section touring maps of the United States will assist you in this work. Thousands of motorists have helped us compile these maps. They have been in process of manufacture for many months. They will be printed in colors.

Stripped Cars After War

Shipments of Chassis Without Bodies Is Foreseen for This Country

Europe to Start Quantity Production With Peace

NEW YORK, March 23—Quantity production of motor cars in Europe will be in force as soon as peace is declared is the prediction of M. S. Keller, president of the American Motors, Inc., which recently announced a comprehensive export service to makers. Export conditions will somewhat change, one of these being in regard to the method of shipping cars.

According to Mr. Keller, one important change will be in bodies. He believes that most of the cars shipped after the war stops will be stripped of bodies and will go over to the other side only in the chassis. He bases this on the fact that there is such a high tariff on cars with bodies on that the European buyer will demand only the chassis, depending on the body builder in his own country to take care of that detail. With this fact in mind, he predicts that Europe will enter extensively into the manufacture of bodies to take care of this demand.

To Use American Parts

American parts will enter largely into the production of European cars, according to Mr. Keller. Instead of turning out an expensive product, as heretofore, the European factories will invade the medium and low-priced fields, having in view the use of the American standardized parts, turned out in large quantities. There is at present a demand for these parts and several foreign companies, particularly in the Scandinavian countries, are preparing to assemble cars and trucks with these.

To take care of the quantity production European companies are preparing to call on our engineers and efficiency experts to go to the other side where they will be used for their knowledge of American ideas on motor car manufacturing and factory system.

The American Motors, Inc., has foreseen the demand for our parts and has prepared to finance foreign purchasers' shipments, cover payments to the manufacturers, packing, shipping, insurance and such other incidental charges as are requisite in the completion of a shipment of merchandise to any part of the world. This service likewise affects all American makers' shipments abroad.

BRISCOE RAISES PRICES

New York, March 23—The prices of the Briscoe fours and the eight have been raised \$80. The new prices are as follows: 4-24, \$685; 4-38, \$845; and the eight-38, \$1,045.







45 Per Cent of Fuel Enters Crankcase Distillation Figures

By H. L. Horning

Engineer and Manager Waukegan Motor Co.

ONE of the aspects of lower gravity fuels which are now being used by motorists is the extent to which fuel not consumed in the combustion chamber leaks down past the pistons. This is aggravated in cold weather and is perhaps slightly aggravated additionally by the use of alloy pistons which are generally made a looser fit than cast-iron types. In some recent distillation analysis of the oil in the crankcase of a motor car, it was found that approximately 45 per cent of it was gasoline or grades of kerosene which had not been consumed in the combustion chamber. The distillation analysis showed that there was only 37½ per cent of good lubricating oil in the crankcase, such oil as is suited for lubrication of cylinder walls and piston rings. This car had had the oil in the crankcase only 9 days and a grade of gasoline testing 58 Baume was used.

In another test of a motor truck in which the crankcase oil had not been changed for two weeks the analysis showed 20 per cent gasoline in the crankcase and an additional 20 per cent of heavier fuels which possessed some lubricating value, leaving but 55 per cent of genuine lubricant in the case.

Conclusions from Tests

These distillation tests of crankcase contents suggest that in the winter season it is very imperative that crankcase lubricant be frequently changed if the best results are going to be had from the engines. It is necessary in the average passenger car to change the lubricant every 2 weeks. In motor trucks it should be changed once a week. In tractors the change should be made every 2 days.

These facts suggest the necessity of a wider use of what is known as the distillation curve in gasoline. As brought out at the meeting in Washington some months ago where fuel was discussed, the term gravity has little meaning. The really essential consideration in a fuel is distillation.

Fig. 1 shows the distillation curve of two grades of gasoline used in the tests referred to. A few words of explanation on how to interpret a distillation curve may be necessary. Curve K shows the distillation curve of a 62 Baume gasoline. This gasoline was used in the motor truck in which 20 per cent of the crankcase lubri-

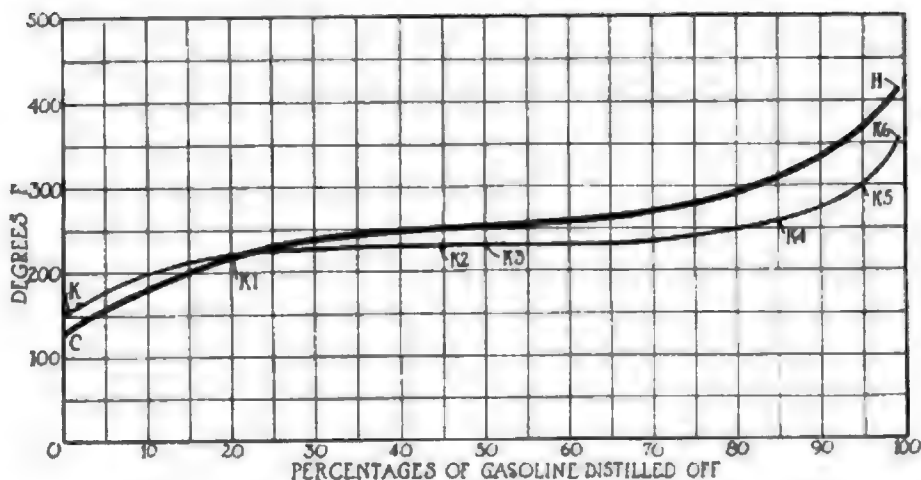


Fig 1—An interesting chart showing percentages of gasoline distilled off at various degrees of heat. Curve K represents 62 Baume and curve C shows 58 Baume gasoline

cant proved to be of this fuel. Starting at the left end of this curve the point K shows that this gasoline started distilling or vaporizing at a temperature of 150 deg. F. The point K1 on this curve is known as the starting point. The curve shows that at the point K1 the temperature is 220 deg. as shown by the figures in the left column, and at this point 20 per cent of the gasoline had passed off in vapor as indicated by the percentage figure along the bottom of the chart. This is what engine designers consider an ideal performance of fuel for starting purposes. In other words, any gasoline that will distill 20 per cent off at 220 deg. F. gives good starting. For this reason the part K-K1 is known as the starting zone of the distillation curve.

Let us follow the curve from point K1 to the right. The curve proceeds almost horizontally, which is a good indication, and means that this gasoline continues to distill off at reasonably low temperatures. This means that too much heat is not necessary to convert it into a vapor. If we follow the curve we find at K2, which is a temperature of 245 deg., that 45 per cent of the fuel has distilled. Pass K3, which is 250 deg., and we see that half of the gasoline has been converted into vapor. Continuing to the right point K4 shows that 85 per cent has been converted into vapor and the temperature has not reached 300 deg. The last part of the curve, from K5 to K6, shows that the temperature had to be increased very rapidly and even then but little of the remaining gasoline was distilled off. The final point of the curve, K6, is known as the end point. It indicates that the temperature was 355 deg. and that at this point 98 per cent of the gasoline had passed into vapor. The test was stopped here, because the remaining contents were largely heavy parts that would not yield any fuel. The point K6 is known as the end point of the distillation curve.

For comparative purposes we are showing another curve C which is that of the gasoline used in the passenger car in the crankcase of which it was discovered that

45 per cent of the contents were gasoline, or combinations of what might be called gasoline and kerosene, in other words, fuels rather than lubricants. This has a 58 Baume fuel. Analyzing this curve through it will be noted that the starting point C at the left end is lower than that of the curve A. This means that the gasoline started distilling at a temperature of 135 deg. F., or lower than the other curve. The gasoline contains some highly volatile constituents which rendered it particularly good for starting as these contents would vaporize at a low temperature and give the necessary explosive mixture. If we move along this curve to the point K1 we see that at a temperature of 220 deg. just 20 per cent of the fuel had distilled so that for starting purposes this fuel might be considered a little better than the one shown in curve A in that it has the lower starting point.

Distills at Higher Temperature

If we trace the curve B to the right from point K1 we will find that it rises higher or is above the curve A. This means that the gasoline distills off at a higher temperature. In other words it means that more heat is necessary to distill it. If you pass to the end point of the curve, marked H, we see that it shows a temperature of 420 deg. which is much higher than that necessary for curve A. At this point not so much of the gasoline had distilled off. In other words there was a greater residue of practically useless matter remaining.

By comparing the curves A and B it is readily seen that curve B represents a gasoline which will not be so thoroughly consumed in the combustion chamber as that represented by curve A. Naturally more heat is required for the curve B gasoline, and if this heat is not present there will be a greater condensation of the gasoline in the intake pipe, a less complete burning of it in the combustion chamber, and naturally more of the gasoline working down past the piston rings into the crankcase. The fact that this gasoline in

(Continued on page 38)









The Readers' Clearing House



WHAT MAKES HIGH SPEED ENGINE Comparative Figures On Two Engines of Different Size

BIG SANDY, Mont.—Editor *MOTOR AGE*—What is generally the difference in construction of an engine only capable of 2000 r.p.m. and one capable of 3600 r.p.m., both being the same size, same ignition systems and same carbureters?

2—Which does a counterbalanced crankshaft reduce—friction or vibration, and in turn, does not the reduction of vibration reduce friction?

3—Which will deliver the greatest power to the rear wheels, an engine with $3\frac{3}{4}$ -in. bore and $5\frac{1}{2}$ -in. stroke or an engine $4\frac{1}{4}$ by $4\frac{1}{4}$, figuring the same gear ratios and chassis for both engines? Which of these engines will show the least vibration? Construction being the same.

4—Which parts of the Hudson Super Six engine are covered by patents?—E. C. Meyers.

1—The difference is in the weight of the reciprocating parts and in the perfection of balance. The better an engine is balanced the greater will be its speed performance. The 3600 r.p.m. will need larger valve areas, and for higher speeds may need heavier valve springs. There are very many other details to be considered.

2—It reduces vibration and resultantly friction.

3—It is impossible to answer which engine will deliver the most power, so much depends upon the construction. The piston displacement of the first is 242.9, considering that it is a four-cylinder engine. The piston displacement of the second engine is 273.32. If one were to consider that the constructions were identical, then it would be reasonable to assume that the engine with the greater piston displacement would deliver the more power.

4—The method of counterbalancing. That is, the method of applying the counterbalancing weights.

ON THE PSYCHOLOGY OF BUYING Reader Speaks for Department of Fundamental Information

Oklahoma City, Okla.—Editor *MOTOR AGE*—I have been a subscriber of *MOTOR AGE* for a number of years, and have not only read the magazine but have preserved the most interesting numbers for future reference. Here are some ideas I would like to express.

The first motor car a man annexes is sold to him; the next one he buys. There is so much difference between the two transactions that I think some publicity organ should step in and bridge the chasm for the purchaser in something like his own language and bring the scientific thought in the construction of a car down to his level.

The man who purchases a new machine has already shown himself to be somewhat of a thinker, or he would not have the money to pay for it, and he is anxious to exchange his money thought for someone

What Not to Ask

Editor's Note—In preparing answers for the Readers' Clearing House of this week's issue, the editor came across a surprising number of inquiries asking how fast certain models will go and how much faster they would go if certain alterations were made upon them. These questions are quite out of our grasp, in fact they can be answered only by those making such changes.

Where manufacturers have made official speed records under the sanction of the American Automobile Association, we will gladly print the speed figures made during that test. Where no tests have been made there is no source of positive information regarding these car speeds and we see no reason why we should guess at it.

Furthermore, the idea of anybody estimating within 5 or 10 m.p.h. how much faster a car will go with aluminum pistons, higher gearing, etc., etc., is absurd. A poor mechanic may install new parts intended to increase the speed and do such a sloppy job of it that the speed will, in reality, be reduced.

The same thing applies to the maximum revolutions per minute of an engine. Two engines of exactly the same model may have a difference in maximum speed of 200 r.p.m. Furthermore, when the engines become used, the maximum changes. It depends to such a great extent on the adjustment and general condition of the engine that no reasonably accurate figure can be given. Another thing we cannot give you with any accuracy. That is car weights.

else's mechanical thought, and in the exchange there should be some way of evening up these commodities. The money thought is guaranteed by the government

and the getter of the shekels is never in doubt. "Let the buyer beware" has been the common law, but a change for the better is gradually taking place, and even the seller is trying to let the buyer be educated.

MOTOR AGE is the publicity medium between the seller and the buyer; both pay for it and are profited by its discussions. But there is still something more that the uninitiated buyer would like to know definitely before parting with his money. An unbiased friend of both parties would tell him in his own style of language and on his own plane of thought just what he would like to know.

For instance, the buyer probably knows what is meant by the number of revolutions per minute, so glibly talked to him when the engine is under consideration, but he cannot get the real value of it as to the work and wearing qualities of this kind of machinery. He knows there are more power thumps, and he may guess that they are lighter ones, but he cannot connect up the reciprocating features in the matter. There are other things, such as vanadium steel and other forms of steel, roller bearings, ball bearings, types of spring, etc.

I am speaking of a department in *MOTOR AGE* where a reader may find this knowledge without paying attention to any other department, unless referred to it.—A. S. Heaney.

DRAWING OF A REBUILT REGAL Reader Explains How He Built Over Car for Speedster

Manson, Ia.—Editor *MOTOR AGE*—In your issue of the 15th inst. I notice a party wants to know how to rebuild a 1912 Regal. I am sending a sketch of a 1911 Regal roadster that I rebuilt. My sketch is one-sixteenth actual size. Outside of per-

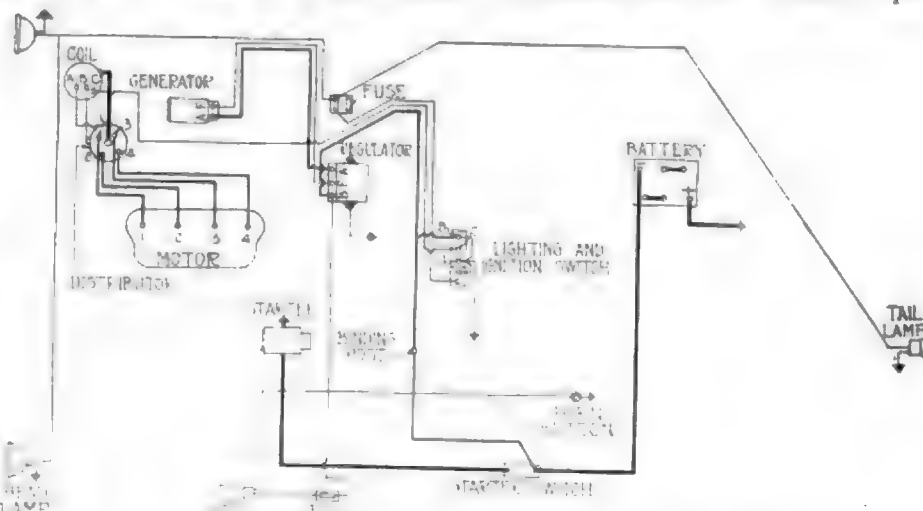


Fig. 1.—Diagram of wiring system used on 1913 Mitchell

ing longer, as the seat can be located to fit the driver when it is dropped.

2—Use the two rings in the top grooves.

CARBON DEPOSITS — PRE-IGNITION Possible That Small Amount of Carbon Raises Compression

Buda, Ill.—Editor Motor Age—I have an Apperson 4-45, 1912 model which knocks very badly whenever there is the slightest carbon deposit in the cylinders. This necessitates frequent scraping and even though the amount of carbon cleaned out each time is very small, it seems to cure the engine of its knock for the time being. I have checked up the timing, and it is correct. Also the bearings are tight. Is it possible that the slight amount of carbon in the combustion chamber raises the compression, which is already very high in this engine, enough to cause pre-ignition.

2—If the compression of this motor is too high, what thickness of fiber gasket would you suggest be placed between the crankcase and cylinders?

3—Also what effect would lowering the compression have on the general efficiency of the engine?—C. C. Chase.

1—It is very possible that it might.

2—This is something you would have to experiment with. A gasket $\frac{1}{4}$ -in. thick would make considerable difference.

3—Lowering compression would reduce the power. The extent of this reduction would depend on the thickness that the gasket would have to be. It would probably make very little difference, however.

WILL USE OLD MARMON AS RACER

Tapering of Cams Might Help Speed Somewhat

Milwaukee, Wis.—Editor Motor Age—I am considering entering a 1911 model 32 Marmion car in some 1-mile dirt track races this spring. I intend to have aluminum pistons fitted. Does Motor Age advise any change in the valve or ignition timing? Would the tapering of the cams help the speed to any great extent? Where on the engine do you advise attaching the oil lead from the auxiliary hand pump? The car at present is geared 3 to 1 with 34 in. wheels. How much higher gearing would be advisable for this work and where could such gears be secured?—K. A. Bergenthal.

It might be well to set the ignition timing ahead one tooth. There is no need of changing the valve setting. Motor Age has no data concerning the standard taper on these valves. If they are flat topped with a slow lift and drop, it would undoubtedly be a help to taper them for quicker opening and closing. The oil lead will attach to any convenient point on the side of the crankcase, preferably at a point where the oil will drop unimpeded into the pump. The car would very likely stand $2\frac{1}{2}$ to 1 for 1-mile dirt track work. Special gears might be procured from the Marmion factory. At least the makers can advise you where to go for them.

OIL LEAKS FROM TIMING GEARS

Directions for Removing End Play in
Buick Driving Yoke

Hamilton, Ohio—Editor Motor Age—I find it almost impossible to keep the timing gears of my 1914 Buick B-37 properly lubricated, as the oil, even though it be of a consistency approaching that of hard oil, persists in leaking out from around the pulley that drives the fan. Is a washer of some kind used to keep the oil in? If so, how can the trouble be remedied. Is the pulley easily removed from the end of the camshaft which drives it?

2—What means is employed to keep the timing gear oil from working its way around the crankshaft and also the camshaft and entering the crankcase? How is the oil kept from seeping out of the timing gear case from around the crankshaft at the point where it protrudes through the timing gear case?

3—There is considerable play at the point where the yoke on the front end of the torsion tube attaches to the swivel arrangement, which in turn attaches to the transmission case. This is especially noticeable when the car is running very slowly and begins to huckle. How can this looseness be adjusted?—Old Subscriber.

1—Leakage of oil from around the fan pulley on the Buick model B-37 engine may be due to: First, use of too much engine oil; second, endeavoring to fill the pumpshaft bearing with engine oil through the right-hand wing plug; third, to improper adjustment of the main bearing which allows the engine oil to work forward through this bearing into the timing gear case. In any case we would suggest that you take this car to the nearest Buick dealer where you can have these pieces carefully examined.

2—The front main-bearing shims, when fitted at the factory, are set up tightly against the crankshaft journal to prevent any engine oil from working forward into the timing gear case, but if removed by an inexperienced repairman, they may be left

IN WRITING AN INQUIRY to the Readers' Clearing House Department

DESCRIBE THINGS COMPLETELY!

If your car is giving trouble, tell us all about the trouble and what you have done to try to remedy it. Always bear in mind that we are not looking at your car when we are reading your inquiry. Try to picture everything to us as we might see it if we were looking at your car. You understand it. Make us understand it.

Do not write in and say, "My engine has developed a serious knock. What is the trouble and how can I remedy it?" It is as impossible to give an intelligent answer to such a question as it is to answer the question, "Why is a mouse?" Tell us where the knock is, what it sounds like, what effect it has on the operation of the engine, under what driving condition it is most evident, etc. Let us have some tangible information to work on.

Do not ask us questions concerning motorcycles and motor boats. Our field does not cover these industries. Do not ask us for working drawings of engines, gearsets, etc. We endeavor to conduct an information department, but not an engineering department of such a nature. We cannot design the mechanical units of a car for you. This also applies to specifications for speedster bodies to be applied to touring or roadster equipped chassis. We will gladly give a general plan of a body, showing how it might appear when complete, but we cannot furnish complete patterns and working drawings for the construction of these bodies.

too loose, which would result in the trouble you mention.

3—End play in the driving yoke may be removed by tightening the adjusting collar on the forward end of the propeller shaft housing.

EFFECT OF FORD OVERHEAD VALVE Approximate Power Increase of 15 Per Cent with Iron Pistons

Nogales, Ariz.—Editor Motor Age—Discuss in Motor Age the effect in increase of power and piston engine speed, and any disadvantages if overhead valves and aluminum pistons were installed in the Ford engine.—C. A. Donaldson.

Tests have shown that in the aggregate an engine with overhead valves will produce approximately 15 per cent more power than an L-head engine, considering that the bore and stroke and general design of reciprocating parts are the same. This is based on the supposition that both use the same kinds of pistons. Were a Ford engine to be equipped with a PROPERLY DESIGNED overhead valve mechanism and aluminum pistons, it might be safe to assume that the aggregate power increase would be 25 per cent or more. It would be quite impossible to approximate the increase in engine speed. However, if the car were to be equipped with 3 to 1 gears instead of the standard gearing, and the power gained enough to maintain the same maximum engine speed as with the original engine, the following results would be obtained:

With the standard gearing it is a fair estimate that the maximum car speed is 45 m.p.h., and assuming that the car is equipped with 30-in. wheels the engine speed will be approximately 1750 r.p.m. Now consider the engine equipped with an overhead valve mechanism which will maintain this engine speed with a gear ratio of 3 to 1. The car would then have a maximum speed between 55 and 60 m.p.h. This is a very conservative estimate all the way through.

Wants to Repair

Crystal Lake, Ill.—Editor Motor Age—My car, which is 1914 model, was revarnished in 1915, is now getting to look quite aged from the paint scaling off in patches clear down to the metal base. Can I repaint it myself and do a fairly satisfactory job?

2—How can I get the old paint and varnish off so the finished job will look smooth?—H. V. Fulton.

1—Yes. There are several paint kits on the market which contain everything which is necessary to complete a good painting job.

2—It can be ground off with emery paper. The job should then be sanded to impart a smooth finish to the metal. It is advisable to use a fine grade of emery paper so that there will be no deep scratches into the body metal.

Salaries of Engineers

St. Thomas, Canada—Editor Motor Age—What is the salary of an expert mechanical engineer?

2—In attending university, how many years are required to reach a high degree in engineering?

3—How can I clean the oil out of the crank case of a 1912 Cadillac touring car without removing the crankcase?

4—How many miles to the gallon of gasoline can one get with the 1917 Cadillac eight?—J. R. Birch.

1—Anywhere from \$1,500 to \$25,000 a year and maybe more or maybe less.

2—At least 4 years.

3—Remove the drain plug on the bottom of the crankcase.

4—There have been no official tests concerning the gasoline consumption of this model.

DODGE MULTIPLE-DISK CLUTCH Explanation and Hints for Proper Adjustment and Care

Little Rock, Ark.—Editor *MOTOR AGE*—Give a description of the multiple-disk clutch used in the Dodge Bros. Car and tell me what things are necessary to do to care for it properly.—John McNutt.

The clutch consists of a series of driving and driven disks. The driving disks are covered on both sides with a wire-woven asbestos fabric riveted to them and the driven disks are plain. All the disks are free to slide on their respective supporting pins, and are held together by means of the heavy coil springs inside of the clutch hub.

To adjust or tighten the clutch spring it must be compressed sufficiently to allow the split washer which fits into one of the three grooves cut on the clutch shaft to be moved forward so that it fits into the next groove. After this has been done, care should be taken to see that the two halves of the split washer fit securely into the proper groove on the clutch shaft, and that the clutch spring retainers fit tightly around the split washer.

Keep the drain hole in the bottom of the clutch housing open, so that any oil may be readily drained out. The grease cup located on the toe board to the right of the accelerator pedal, which lubricates the ball-bearing clutch release, should be kept well filled and should be given one complete turn every 100 miles.

Make sure that the clutch release tubes are tightly connected and unobstructed.

READER WANTS AN OLD STEAMER Has Use for Second-Hand Equipment on His Farm

Eckford, Mich.—Editor *MOTOR AGE*—What is the address of Stanley steamer company?

2—Where can I get cuts and illustrations with description of the old White steamer engines and boilers?

3—Is there any company manufacturing and selling just the steamer engines and boilers?

4—In what ways have the Stanley cars been improved over the ones built 2 or 4 years ago?

5—How long has the Stanley company been

making steamers?

6—Do you know where one could purchase a second hand steamer engine?

7—What was the rated horsepower of the old White steamers, and what was the size of cylinders and speed of crankshaft?

8—Were the engines of the compound type? 9—Did they use a transmission and a clutch? If so, where was it located?

10—Did they reverse the engine to back the car? I am thinking of getting one of these steamer engines for power purposes here on the farm.—Ira Hayes.

1—Stanley Motor Carriage Co., Newton, Mass.

2—Possibly from the White Co., Cleveland, Ohio.

3—Not to our knowledge.

4—See the article beginning on page 37 in the March 22 issue of *MOTOR AGE*.

5—Since 1897.

6—Not unless you could pick one up from the service stock of one of the steam car factories.

7—There were two sizes of steamers built each year. In the last year of its manufacture, 1912, there was a 20- and a 40-hp. engine. In previous years the engines were slightly different. Which model do you wish to know about?

8—Of the double-acting type, yes.

9—No.

10—Yes. It is a typical steam engine similar to those used in a locomotive.

READER REBUILDS MITCHELL CAR Built Body Out of 20-Gage Sheet Iron— Novel Windshield

George, Iowa—Editor *MOTOR AGE*—I have rebuilt a 1910 Mitchell as illustrated in Fig. 4. I made a false front on the radiator and placed a small bulb in the tip for a dimming light, and also the electric headlights. These are run from a storage battery which I hung underneath the body.

I built the entire body out of 20-gage sheet iron and upholstered the seats with Pantosote. There is a 35-gal. gasoline tank on the rear and a false tank of 8-in. diameter representing an oil tank, although used for a tool compartment.

Another novelty I have worked in is the windshield. This is made out of an old style shield, just cutting the glasses round and binding them with $\frac{1}{4}$ by $\frac{3}{8}$ -in. band iron and fastening them to the cowl.

Regarding rebuilding of the engine for more speed, I have changed the valve timing and also lightened the connecting rods and pistons by drilling holes, filing and turning them down in the lathe.

Upon completion of the mechanical work

I painted the car with a green body and white wheels and it certainly makes a very nifty speedster.—Homer Bodurn.

MEANING OF LAPPING IN RINGS Explanation of Common Method of Fitting Into Cylinders

Mayfield, Kan.—Editor *MOTOR AGE*—Explain the meaning of lapping a piston ring.

2—Also, where I can obtain an axle like the illustration of the dropped front axle on page 35 of the March 1 issue?—John Threlfall.

1—The process of lapping a piston ring involves grinding the ring to fit the cylinder by use of a suitable abrasive. The usual method of doing this is to place the new rings into an old piston which is a duplicate of the piston to be used in the car, although it may be done with the pistons to be used if the grinding is not done too long. The piston is equipped, through its wrist pin, either with a connecting rod or with a specially-made rod which may be grasped in the hand so that the piston may be moved up and down in the cylinder. The rings, piston and cylinder wall should be smeared with an abrasive paste. The emery within this paste should be very fine grade. Then, by moving the piston and its rings up and down within the cylinder, imparting an oscillating motion to the piston, the rings will be ground to a perfect fit all around against the cylinder wall. This grinding should not be continued too long, as with very little effort too much of the surface of the cylinder wall can be removed, making a sloppy fit of the piston.

2—*MOTOR AGE* knows of no one making an axle of this type. Those we have seen used are hand forged jobs made up from suitable alloy steel. Some of them have been made from axles used in other makes of cars.

Gasoline Saving

Minneapolis, Minn.—Editor *MOTOR AGE*—In your opinion would a Willys manifold installed on my Roan 8, Model C car save fuel? I understand it already has a water jacket. I am getting less than 8 miles to the gallon in warm weather, and at present only about $5\frac{1}{2}$ to the gallon?

2—Would equal parts of gasoline and kerosene in any way injure the car, aside from harder starting?—E. Shumpik.

1—Yes.

3—No.

Gearing of Detroiter

San Antonio, Texas—Editor *MOTOR AGE*—I am thinking of buying a Detroiter Six-45, five passenger 1917 model, and wish to be enlightened on gearing of this car. This car has a 7 W continental motor geared at 4.75 to 1, and the advertised weight of car is 2575 lbs. Could you tell me the advantage of gearing this car down so low, or is this 7 W continental motor a high speed job? It seems to me that a car weighing 2575 lbs. could be geared much higher and still be capable of climbing ordinary hills in high gear, considering the advertised power of 45 h.p.—O. B. Gallagher.

The engine is a high-speed type as are all new Continentals built for passenger car use. However, the car would probably stand a gearing of 4 to 1 and negotiate all ordinary roads.

Tracing Trouble By Sound

Minneapolis, Minn.—Editor *MOTOR AGE*—Inform me of the sort of a sound I will have to listen for to determine whether there is end play in the crankshaft or in the cam shaft? And when this is determined, what can be done

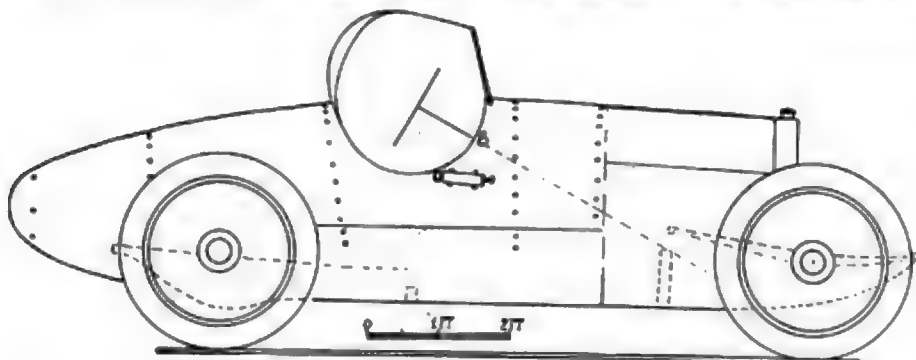


Fig. 4—Diagram showing how a Motor Age reader rebuilt a 1911 Regal

















Bruno Kassman of Stockholm, Sweden; **Amerikaansh Technisch Bureau of Amsterdam, Holland;** and **Andre Weil & Co. of New York and Paris, France.**

J. & D. Tire Elects—The officers of the J. & D. Tire & Rubber Co., Charlotte, N. C., have been re-elected as follows: President, H. O. Smith; vice-president, Thomas J. Northway; secretary, Lee A. Folger; and treasurer, C. C. Coddington.

Gem Buys Plant Site—The Gem Motor Car Corp. has purchased property and building at Grand Rapids, Mich., for a plant. An order has been placed with the Belknap Wagon Works for 1000 bodies this year. The building purchased by the company occupies 10,000 sq. ft. of floor space.

Bartach Leaves Bosch—Alfred H. Bartach has resigned as advertising manager of the Bosch Magneto Co. to join the forces of the McLain-Hadden-Simpers Co., New York and Philadelphia. Robert S. Westcott, who has been assistant advertising manager of the Bosch company, succeeds Mr. Bartach.

Mitchell Motors to Add—The Mitchell Motors Co., Racine, Wis., will award contracts about April 1 for a large warehouse unit which will be part of the extensive enlargement scheme recently undertaken. The new warehouse will be of fireproof construction, 100 by 300 ft. in size, and four stories and basement high.

Hupp Resigns from Emerson—R. C. Hupp has resigned as vice-president, director and chief engineer of the Emerson Motors Co., having completed the work of designing and building the first Emerson cars. Mr. Hupp has opened an office at Long Island, N. Y., and will announce his future plans later.

Akron, Ohio—Puncture Proof Tire Co., to manufacture tires; capital stock, \$75,000; incorporators, Lester R. Reeder, Wilbert J. Quillen, Thomas P. Smith, E. D. Wonn and Charles K. Strobel.

Akron, Ohio—Denmo Truck Sales Co., to sell trucks; capital stock, \$5,000; incorporators, E. P. Parshall, Agnes E. Parshall, Harriet E. Parshall, W. L. Pardee and J. M. Poulson.

Ashland, Ohio—Nelson Motor Car Co.; capital stock, \$10,000; incorporators, J. H. McCleart, Hays Nelson and E. L. Heffrich.

Asthabula, Ohio—City Taxicab & Transfer Co., to operate a taxicab company; capital stock, \$5,000; incorporators, F. C. Mullen, J. M. Klumpke, A. O. Rohl, H. J. Kintala and D. F. Dunlavy.

Buffalo, N. Y.—Lutz Motor Co., to manufacture a steam motor car; capital stock, \$200,000; incorporators, L. R. Lupton, G. H. Lutz and J. H. McLean.

Canton, Ohio—Holmes Automobile Co., to manufacture motor cars; capital stock, \$2,500,000; incorporators, Arthur Holmes, Clarence O. Herbruck, George W. Belden, H. E. Black and H. L. Alexander.

Canton, Ohio—Canton Auto Supply Co., to deal in accessories; capital stock, \$5,000; incorporators, W. H. Whartenby, C. C. Whartenby, M. M. Cline, R. W. Cline and H. C. Pontius.

Canton, Ohio—Thurman C. Smith Motor Co., to deal in motor cars; capital stock, \$25,000; incorporators, Thurman C. Smith, C. D. Smith, C. W. McLaughlin, D. M. McLaughlin and S. A. Allen.

Chicago—Keystone Motor Co.; capital stock, \$10,000; incorporators, William Brinkman, B. F. Bartel and William Hardy.

Chicago—Universal Auto Sales Co.; capital stock, \$12,000; incorporators, James C. Orney, Otto Kerner and Dewitt C. Jones.

Cincinnati, Ohio—Lexington Motor Sales Co., to sell motor cars; capital stock, \$6,000; incorporators, David C. Aaron, Robert E. McMahon, E. G. Aaron, V. E. McMahon and Samuel Wolfstein.

Cleveland, Ohio—J. T. Auto Devices Co., to deal in motor car accessories; capital stock, \$10,000; incorporators, John H. Smart, Carl B. F. Ford, William T. Bishop, W. W. Watkins and George Wyman.

Cleveland, Ohio—Suprema Motors Corporation Co., to manufacture motor cars; capital stock, \$100,000; incorporators, W. I. Quinn, M. F. Gimney, C. E. Buchheit, P. Bredel and H. I. Lodwick.

Cleveland, Ohio—Fowney-Moore Co., to manufacture motor car tops; capital stock, \$10,000; incorporators, Clarence G. Fowney, Robert A. Moore, C. C. Williams, John F. Collins and Trenton C. Collins.

Cleveland, Ohio—Cleveland Spring Co., to manufacture springs; capital stock, \$50,000; incorporators, John H. Price, E. L. Ostendorf, Richard F. Edwards, H. Rosecrans and E. E. Maynard.

Cleveland, Ohio—Cleveland Top & Specialty Co., to make tops and accessories; capital stock, \$20,000; incorporators, E. T. Ruhl, W. A. Cham-

Before going to the Emerson he was connected with other motor car companies, namely, the Oldsmobile, Ford, Regal, Hupmobile, R. C. H. and Monarch.

Foundry to Rebuild—The Campbell, Wyant & Cannon Foundry Co., of Muskegon, Mich., will erect a factory building to cost more than \$100,000 on the site of the plant which recently burned.

Williams Goes to Stephens—O. C. Williams, formerly special traveler through the East for the Studebaker, has become assistant sales manager of the Stephens motor branch, with office at Moline.

Bissell with Detroit Steel Products—R. Bissell, for the last three years research engineer for Dodge Bros., has joined the spring department of the Detroit Steel Products Co. in a similar capacity.

Bradner Will Direct Auto Body—H. E. Bradner, manager of the Auto Body Co., Monroe, Mich., for the last sixteen years, has been elected president of that company following the death of Lawrence Price, the former president.

Rude Now With Fiat—T. M. Rude, formerly purchasing agent for the Scripps-Booth Corp., is with the Fiat Co. at Poughkeepsie, N. Y., in a similar position. J. M. Kemp has been appointed purchasing agent for Scripps-Booth.

Stegeman Truck Expands—The Stegeman Motor Truck Co., Milwaukee, Wis., is rushing work to completion on additions which will afford 50,000 sq. ft. of floor space. After April 1 or May 1 the output of Stegeman trucks will be about doubled. The manufacture of the complete axles used in the trucks will be undertaken at once, and numerous

other parts, until now purchased, will be made in the enlarged shops.

Henderson Permanent Manager—O. B. Henderson has been appointed permanent manager at Los Angeles, Cal., for the Willys-Overland Co.

Amazon Rubber Offers Stock—The Amazon Rubber Co., Akron, O., is offering a new issue of stock at \$100 a share. The stock includes \$400,000 of common and \$100,000 of 7 per cent preferred.

Smith With Cleveland Battery—Mr. Smith, who has been the western manager of the American Garage & Auto Dealer, has resigned to take charge of the sales of the Cleveland Battery & Electric Co.

Signs Kriplen for Hudson—Ralph Kriplen, one of Eddie Rickenbacher's mechanics on the Maxwell team last year, has been signed by Arthur Hill, manager of the Hudson Motor Car Co. racing team, for the coming season.

Dittmer Gets Covert Appointment—A. H. Dittmer has been appointed purchasing agent for the Covert Gear Co., Lockport, N. Y., to succeed E. J. Fritton, who resigned recently. Mr. Dittmer had been with the Chalmers Motor Co. previous to this appointment.

Hayes Company Reincorporates—The Hayes Machine Co., Oshkosh, Wis., which recently engaged in the manufacture of front and rear axles for motor cars, trucks and tractors, has incorporated its business under the style of E. B. Hayes Machine Co. with a capital stock of \$175,000. The machine shops and foundry will be enlarged to accommodate the demands for the new and old products.

Recent Incorporations

Berlin, H. H. Flandermeyer, W. H. Jantsen and E. D. Cray.

Cleveland, Ohio—A. F. Waite Auto Livery Co.; capital stock, \$20,000; incorporator, A. M. Waite.

Cleveland, Ohio—Consumers Motor-Supplies Co., to deal in supplies; capital stock, \$50,000; incorporators, Edward Younker, A. C. Teare, Pearl C. Smith, L. M. Sewell and Clara C. Thompson.

Cleveland, Ohio—Catatract Motor Sales Co., to deal in motor cars; capital stock, \$20,000; incorporators, Anthony J. Schuettich, Charles L. Lazear, O. E. Schultz, T. J. Moffett and Harry P. Coates.

Corpus Christi, Tex.—Reed Automobile Co.; capital stock, \$12,000; incorporators, J. B. Oatman, D. T. Reed and Morris F. Briggs.

Dallas, Tex.—Dallas Motor Sales Co., to purchase and sell motor goods and merchandise, farm implements, etc.; capital stock, \$5,000; incorporators, L. E. Couch, L. B. Couch and Roy Tufts.

Fort Wayne, Ind.—Jeffery Auto Sales Co.; capital stock, \$10,000; incorporators, William Fuhrman, George T. Fox and Arthur Fuhrman.

Fort Worth, Tex.—Emerson Co.; capital stock, \$50,000; to assemble and deal in motor cars and supplies; incorporators, J. W. Price, O. E. McCoy, S. O. Lovejoy and others.

Grand Rapids, Mich.—Simplicity Wheel Co.; capital stock, \$40,000; incorporators, Elmer Gray, Fred B. Raymond, Frederick W. French, Louis Barth and George Clapperton.

Houston, Tex.—Texas Oldsmobile Co.; capital stock, \$10,000; incorporators, J. M. Wiggins, W. F. Anderson and Edward H. Moore.

Houston, Tex.—Battery Equipment & Storage Co.; capital stock, \$10,000; incorporators, S. M. Griffin, H. M. Harbin and R. C. Patterson.

Huntington, W. Va.—Bennett Motor Co.; capital stock, \$50,000; incorporators, George D. Bradshaw, D. D. Evans, Dr. I. C. Hicks, Paul Bennett and W. H. Roberts.

Indianapolis, Ind.—Noble Motor Truck Co., to manufacture trucks and tractors; capital stock, \$30,000; incorporators, H. L. Postle, J. Munton, G. M. Patterson and John Hauff.

Joliet, Ill.—Frank L. Klap & Kahn Automobile Co.; capital stock, \$8,000; incorporators, F. L. Klap, M. E. Kahn and H. E. Marcus.

Manassas, Ohio—Halladay Motor Car Co., to manufacture motor cars; capital stock, \$1,000,000; incorporators, T. E. Huth, V. F. Stewart, J. N. Horne, Geo. B. Stacey and E. D. Baxter.

Middlefield, Ohio—A. C. Grant Motor Co., to deal in motor cars; capital stock, \$10,000; incorporators, A. C. Grant, Anna B. Grant, E. M. Grant, Joe E. Johnson and S. G. Smith.

New York—Leader Tire & Rubber Co., Inc.; capital stock, \$5,000; incorporators, H. H. Jacobson, C. A. Weldon and S. Bernheim.

Norfolk, Va.—Gay Motor Corp.; capital stock, \$25,000; incorporators, J. L. Gay, Sr., and O. H. Gay.

Providence, R. I.—Providence Auto Equipment Co.; capital stock, \$80,000; incorporators, Arthur M. Allen, P. F. Kellogg and Stuart Montgomery.

Richmond, Va.—Craig Motor Corp.; capital stock, \$10,000; incorporators, F. H. Craig and Stuart D. Craig.

Richmond, Va.—Bowman Motor Car Corp.; capital stock, \$300,000; incorporators, J. M. Weaver, W. B. McCrory and Herbert Patterson.

Rosendale, Wis.—A. H. Blumke & Sons Co., to deal in motor cars, trucks, tractors, farm implements, etc.; capital stock, \$35,000; incorporators, A. H. Blumke, O. R. Blumke, Herbert A. Blumke.

San Antonio, Tex.—Universal Car Co.; capital stock, \$15,000; incorporators, Grover C. Shaw, Robert S. Yantes, Charles E. Biggs and others.

South Bend, Ind.—Bill Mfg. Co., to manufacture and put on the market the Bill Auto Spark Retarder; capital stock, \$10,000; incorporators, J. J. Ohlia, F. A. Flocken, C. D. Hudnut, C. H. Hascall, F. A. Flocken, C. D. Hudnut, J. J. Ohlia and William Bauch.

Springfield, Mo.—Elgin Automobile Co.; capital stock, \$12,000; incorporators, J. W. Robertson of Oskaw, R. E. Umparee, J. W. Garrett, J. W. Fusca and B. B. Paul.

Staunton, Va.—Bright Electric Co., Inc.; capital stock, \$10,000; incorporators, W. West Bright and Guy S. Davis.

St. Louis, Mo.—No-Chain-Truck-Unit Co.; capital stock, \$8,000; incorporators, J. E. McCully, J. L. Schertz, E. H. C. Lake and J. P. Gamp.

St. Louis, Mo.—Kerosene Motor & Tractor Co.; capital stock, \$10,000; incorporators, J. M. Leonard, L. E. Brandenburg, O. C. Weber and Charles F. Deitz.

Toledo, Ohio—Peerless Rubber Products Co., to manufacture rubber articles; capital stock, \$10,000; incorporators, John H. Smart, Carl B. Ford, William T. Bishop, George Wyman and W. W. Watkins.

Toledo, Ohio—Interlake Auto Transportation Co., to operate a bent line for transportation of motor cars; capital stock, \$100,000; incorporators, William M. Richards, Oscar J. Smith, Bernice Swisher, Myrtle Hotchkiss and Helen Skidmore.

Youngstown, Ohio—Elsie & Christine Co., to sell motor car parts; capital stock, \$10,000; incorporators, H. Elsie, Elsie, Louis L. Christine, F. Irene Elsie, Elizabeth L. Christine and L. B. Webb.





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NEXT WEEK

"What becomes of the old cars" is often the subject
of speculation. The question as regards some of them
is answered in a feature article in Motor Age in the
issue of April 12. Also there will be more of the short
tours as inaugurated this week.

"NORMA" BALL BEARINGS

(PATENTED)



If the bearings of your ignition ap-
paratus or of your lighting generator
fail, where is the advantage of an engine
of surpassing quality or of a car of
surpassing design? As determining
the service capacity of your car, can any
detail—how small soever—be consid-
ered of minor importance?

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Bearings in the high-grade magnetos and
lighting generators used on cars of the better
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proved dependability of "NORMA" Bearings
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ings as a mark of quality in car and acces-
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On the assumption that each motor vehicle travels on an average of 5,000 miles a year, the combined distance cars travel in a year would equal 17,500,000,000 miles, or 700,000 times around the world

nessee 35 miles of surfacing and 115 miles of grading, Georgia 95 miles of rock and shell, 125 miles of chert and sand clay, and 160 miles of grading, while Florida surfaced 250 miles and graded 200 miles.

Dixie highway officials expect 1917 will complete 90 per cent of new surface between Nashville and Chattanooga and between Berea, Ky., and Knoxville, Tenn. It also is expected that 75 per cent of the highway in Florida will be in good condition by the end of this year. The heavy rains and storms of the winter months have taught the southern states the folly of building sand clay, chert, or light macadam roads. Five counties in Georgia through which the Dixie highway passes have campaigns on for an average of \$1,000,000 each for permanent roads and the idea of building for permanency is taking root throughout the south.

Jackson Highway Improvements

Except for the southern portion, the Jackson highway is surfaced practically the entire length. About 100 miles of highway were constructed in 1916 at an average cost of \$40,000 per mile.

The Jefferson highway, which is one of the newer roads crossing the country from north to south, is rapidly becoming a leader in highway work. In 1916 Louisiana graded 87 miles and surfaced 53. Texas graded 103 miles and surfaced 81. Oklahoma graded 61 miles and surfaced 23. Kansas graded 61 miles and surfaced 59. Missouri graded 53 and surfaced 35. Minnesota graded 151 miles and surfaced 107. Manitoba graded 11 and surfaced only 3 miles.

At the close of 1916 25 per cent of the entire 2,609 miles of the Jefferson highway was

graded and surfaced and it is expected that 50 per cent of the total mileage will be graded and surfaced by the end of 1917. Fifteen hundred miles of this highway are now marked, but not continuously, although present plans call for marking the highway its entire length within the next 90 days.

Approximately one-third of the Lincoln highway is now hard surfaced and the balance is graded dirt and native gravel. Approximately 90 per cent of the New Jersey section is either concrete or macadam. Pennsylvania maintains its section of the Lincoln highway of 400 miles, probably at

greater expense than any other state, fifteen men constantly inspecting this section and reporting on needed repairs. Ohio at the close of 1916 had 87 miles of brick, 44 miles of waterbound macadam and tarvia, 97 miles of repaired macadam and 30 miles of dirt on its part of the Lincoln highway. It is estimated that at the present rate of progress the Ohio section of the Lincoln highway will be a hard-surfaced, all-weather road within two years.

Lincoln Highway One-Third Surfaced

Seven Indiana counties spent \$706,108 on their part of the Lincoln highway last year. There are now 40 miles of brick and concrete in two counties and it is expected that the next two years will see the entire Indiana section hard-surfaced. Illinois spent \$256,800 on the Lincoln highway last year, some of the new construction work being brick and macadam. Iowa spent \$904,955, Nebraska \$367,300, Wyoming \$60,650, Utah \$275,500, Nevada \$69,140 last year.

Expenditures made last year were: Washington \$405,000, Idaho \$100,000, Montana \$100,000, Dakota \$60,000, Minnesota \$60,000, aggregating approximately \$725,000, excluding Wisconsin and Illinois, where figures are not available, but probably \$100,000 would cover the expenditures of these two states for 1916. This year and next Washington plans to spend \$1,000,000, Idaho \$150,000, Montana \$300,000, North Dakota \$200,000, including fed-

eral money on the National Parks highway.

Two hundred miles of the National Parks highway in Washington is graded gravel; Idaho has 50 miles of graded gravel and 50 miles standard grade. Two hundred and five miles of the Montana section is standard graded and the balance dirt. In North Dakota all but 50 miles is graded dirt, while Minnesota has 50 miles of gravel and the balance made in dirt. Wisconsin has 50 miles of gravel, Illinois 50 miles of old macadam and 10 miles of paved roads.

Who Pays?

Several states within the last year have launched movements for the issuance of big bond issues, Illinois probably taking the lead in proposed bond issues of this kind. It contemplates raising \$60,000,000 to build a 4000-mile system. Who is to pay for it? Why, the motorists, through submission to a 100 per cent increase in license fees.

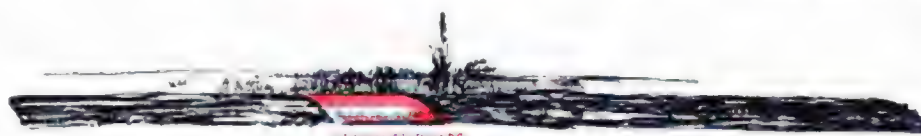
California has a big bond issue and so have perhaps a dozen other states. Wisely expended it will mean that the rank of several states in the hard-surfaced road column will very likely be changed considerably from the figures presented elsewhere in this article.

Some cities on our through highways have kept check on the number of foreign cars passing through for given periods and the results have been almost beyond belief. One hundred cars a day and in a number of cases more than that have been checked. The enormous revenue that cities along cross-country highways will get from tourist traffic should be an incentive to expend more money on the roads, to mark them well and to encourage this class of travel.

Marking highways has progressed more perhaps since the great volume of travel cross-country in 1915 than in all the preceding years put together. Some states, Indiana for example, have passed laws making the marking of roads imperative. Go in almost any direction nowadays and road markers flourish. Some of them only tell you that you are on a marked road, while others tell you the distance from that point to towns in each direction. This latter seems the ideal marker.

Within the last twelve years the annual expenditures on roads and bridges by the several states, that is outside municipalities, has increased from \$80,000,000 to almost \$300,000,000, or an increase of more than 275 per cent. During the same period the annual expenditures from state funds for road and bridge construction and maintenance have increased from \$2,550,000 to

\$53,492,000, or almost 2000 per cent. The motor car has been the main factor responsible for this improvement and for the increase in road mileage.



Only 11.3 per cent of our whole highway system of 2,451,660 miles is surfaced





there is an additional penalty of 6 months' imprisonment.

The character of the roads in the various national parks differ materially. Of course, the roads were originally built for use of horse-drawn stages and in places are quite narrow. However, if one adheres to the rules laid down by the park management there is little danger on the roads of any of our parks. Since the several parks were opened to motor traffic there has been no accident of importance, and what minor ones have occurred were due to negligence on the part of the car operator rather than road conditions.

All of the foregoing rules are the same for all of the eight National Parks in which motor tourists are allowed to operate their own cars. Those parts of the rules which apply to one park only are given as follows:

Yellowstone Special Rules

Y¹—Cars must pass around the road system forming the loop, anti-clockwise, as will be seen by arrows printed in red in the guide book furnished by the park. The reverse direction may be taken as follows:

Norris Geyser Basin to Mammoth Hot Springs, between 11 a. m. and 1 p. m. and after 4:30 p. m.

Upper Geyser Basin—Old Faithful—to western entrance any time after 1 p. m.

Grand Canyon to Yellowstone Lake any time after 1 p. m.

Mammoth Hot Springs to Tower Falls, early enough to reach Tower Falls by noon.

Grand Canyon to Norris Geyser Basin direct, any time day or night.

The supervisor of the park has authority to change routing of cars if necessary.

Y²—Motor stages in the Yellowstone are required to travel on regular schedule and they have the right of way. In order that these stages may encounter no delay, accident, or inconvenience from dust, other vehicles must not pass or attempt to pass stages on the park roads. On the other hand, if other cars are signalled for the right of way by a motor bus, they must yield and permit it to continue on its regular schedule.

Y³—Motor cars may enter or leave the park between 6 a. m. and 9:30 p. m. by any of the entrances—Gardiner, or northern entrance; Yellowstone, or western; Cody, or eastern; Snake River, or southern.

Y⁴—Gasoline, oil, tires and accessories are available for purchase at regular supply stations at Mammoth Hot Springs, Upper Geyser Basin, Yellowstone Lake and Grand Canyon. Repair shops and garages are maintained at these points and prices of supplies and rates for repair work are strictly regulated by the Parks Service.

Other Park Rules

Glacier—Motor cars may enter and leave by the eastern entrance and the western entrance at Belton. There is no road, however, connecting the two entrances and cars must be shipped from one entrance to the other if one is to make all the accessible parts of the park by motor. From Belton cars are permitted in the park between 7 a. m. and 9:30 p. m.

Mount Rainier—Cars may enter and leave the park only through the entrance in the southwestern corner on the government road from Ashford, Wash. Between the western boundary of the park and Nisqually glacier, driving is permitted between 6 a. m. and 9 p. m., but no car may enter the park, or leave Longmire Springs or Nisqually glacier in either direction later than 8:30 p. m. Between Nisqually glacier and Paradise there is a one-way schedule, under which cars can leave Nisqually glacier ascending to Paradise and descending on each hour from 8 a. m. to 7 p. m. inclusive, passing at Narada Falls on each half hour. Boys under 21 years of age and women are not permitted to drive cars between Nisqually glacier and Paradise valley.

Yosemite—Cars may enter or leave by any of the seven entrances—Tioga road, Aspen valley, Crane flat, Merced Grove, El Portal, Wawona or Mariposa Grove. The Tioga road is open from July 15 to September 30, the Big Oak Flat road from May 15 to November 1. The El Portal and Valley roads are open all the year, except occasionally during the winter, when there may be some snow on the floor of the valley for a short period.

Mesa Verde—Cars may enter and leave only through the northern entrance which is reached from Mancos, Colo. Cars are permitted on all the park roads, except the portion of Mill's Survey, between Section 64 and Section 327, not earlier than 6 a. m. and not later than 7 p. m. No car is permitted to leave Spruce Tree Camp to make the trip to the northern boundary of the park later than 5 p. m. At all turn-outs between Station 0 and Station 62, and

wherever sign boards shall so announce, cars will stop on the outer edge of the turn and wait 3 minutes to allow any vehicle time to become visible around the turn.

Crater Lake—Cars may enter and leave by any one of the three entrances—western, or Castle Creek; eastern, or Sand Creek; southern, or Anna Creek. Only in case of emergency will cars be allowed to enter or leave the park before 6:30 a. m. or after 8 p. m.

Sequoia—Cars may enter or leave by either of the two western entrances—Visalia and Lemon Cove—or the three entrances from Three Rivers, that is, the Giant Forest road, the Middle Ford road near More Rock or the Mineral King road. Cars are permitted on the Giant Forest road from the western boundary of the park to the Giant Forest Tourists' camp grounds and return at all hours.

General Grant—Cars may enter and leave by way of any of the three entrances—Millwood, North and Stephens Grade roads. The hours for driving are from 6 a. m. to 7 p. m.

General Suggestions

PERMITTS must be conveniently kept so that they can be exhibited to the park ranger if requested. Each permit must be exhibited to the ranger at the point of exit for verification. These permits show the name of the owner or driver, the name of the station where the permit is issued and the state and license number of the car. The government demands careful driving of all and permits only passenger cars carrying persons who are not paying, either directly or indirectly, for the use of the machine.

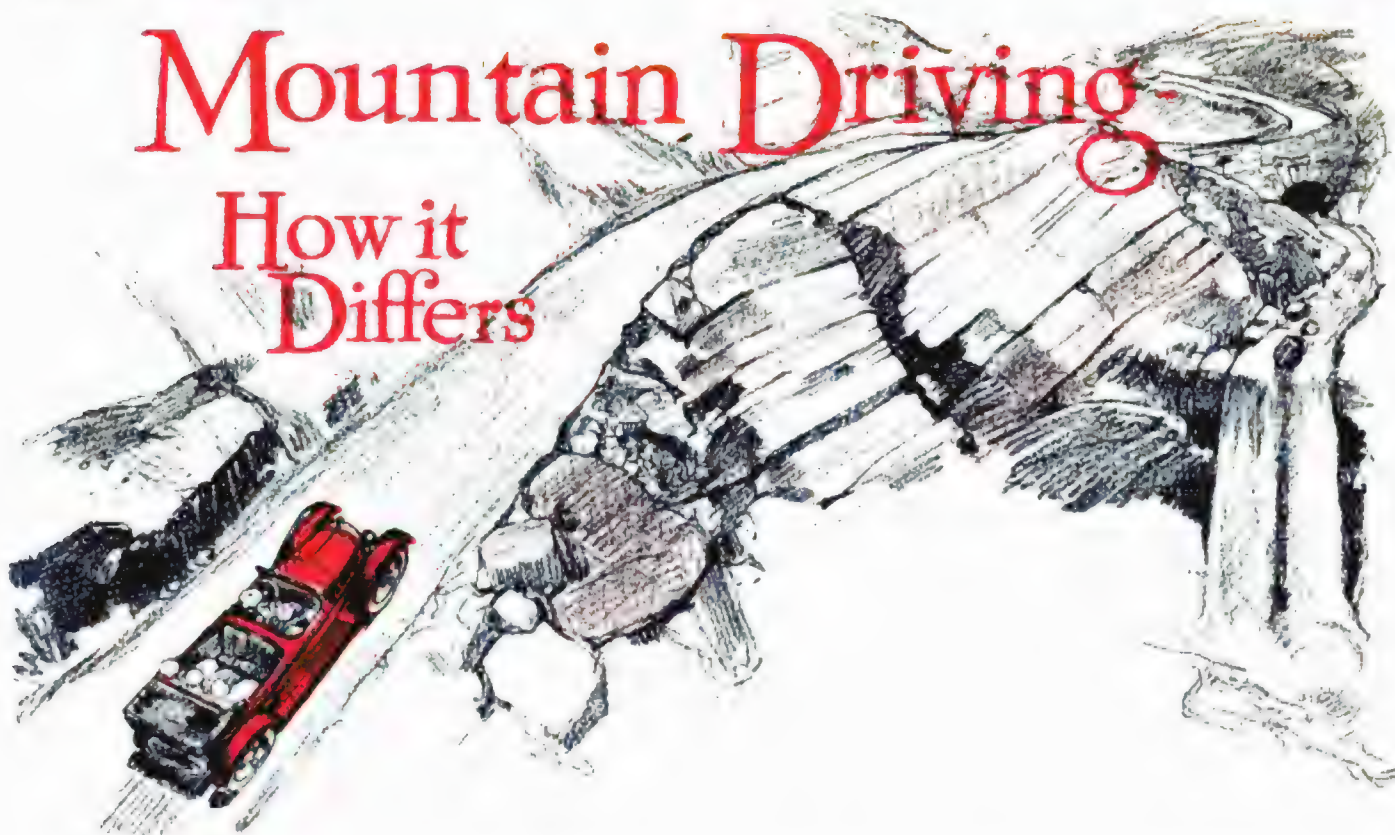
Attention of tourists through the parks is called to the fact that the high altitudes decreases engine power and that supplies of gasoline carried will necessarily have to be greater by from 40 to 50 per cent to carry one a given distance in the parks than would be necessary the same distance in level country. There also is danger from overheating the engine and care should be taken to avoid this.

Speed Regulations in National Parks

	Yellowstone	Glacier	Rainier	Yosemite	Mesa Verde	Crater Lake	Sequoia	Gen. Grant
Up	12	15	12	12	8-10	10	8	8
Down	10	8	8	8	Signs	Signs	Signs	Signs
Curves	8	Signs	8	8	Signs	Signs	Signs	Signs
Passing animals .	8	8	8	8	8	8	8	8
Open stretches ..	20	20	15	20	15	20	15	15

Mountain Driving

How it Differs



FEW months ago—in August to be exact—it was the writer's privilege to act as oil pumper during the tryout of one of the contesting cars in the Pike's Peak hillclimb. It does not matter how quickly we made the 30 miles from Colorado Springs to the summit of the peak which Lieutenant Zebulon Montgomery Pike said never would be touched by the foot of man, much less the wheel of motor car, for speed has no conspicuous part in this particular story. Neither the driver nor myself ever had gone through this experience before and, speaking for myself only, the trip up and down this famous peak of the Rockies resulted in a knowledge of the difference mountain driving brings to light as compared with driving over level or gently rolling country. I am trying to put myself in the place of the tourist who is more familiar with motoring on the level roads of the Middle West than driving the precipitous grades of rugged mountain country and it is to them especially that I speak.

The Effect of Attitude

Inasmuch as you must go up before you come down, probably that part of the going up which differs from comparatively level country driving is the part which should be treated first. If you never have mountaineered afoot you no doubt can appreciate the vagaries of your engine as you first try driving your car into high altitudes. I remember well the feeling that came over me when, after reaching the top of Pike's Peak and removing some

of the misdirected oil and grime from my face, I began a hurried circuit of the none-too-smooth acre or two of rocks that goes to make up the highest-most part of the Peak that stretches itself 14,109 feet toward the heavens. Within 30 seconds my breath came in short pants and my heart pounded with remarkable similarity to the speed of an electric riveter one so frequently hears while the steel construction work of the modern sky scraper is under way. There is no feeling among all the senses of exhaustion that quite equals the feeling of utter goneness which comes from altitude fatigue.

Human and Engine Air Consumption

For example, take the size of your lungs, which in the average human being asks for only 575 cu. in. of air per minute. Compare that with the base consumption of air demanded by the modern, high-speed engine, with a displacement by piston motion in the cylinder of about 75 or 80 cu. in. each turnover, and with your engine traveling at the rate of 1200 r.p.m. when you are gliding along at 20 m.p.h. You are asking the engine to take in 105,600 cu. in. of fresh air every minute and exhaust that much discharged and burnt gas. Disturb the balance of the operation by changing the thinness of the air and imagine what happens. The chances are that your engine will get sick; perhaps very sick.

Any given engine will show less power in mountainous country of high altitudes than it will deliver at sea level. There is a good reason for this and it is a physical impossibility for the engine to do other-

wise. The difference is due to the lower atmospheric pressure the higher we get. That is, the pressure of the atmosphere at sea level is approximately 15 lbs. to the square inch, while at 5000 feet above sea level the pressure is approximately 12½ lbs. to the square inch and at 10,000 feet, 10 lbs. to the square inch. From this it is evident that the final pressure attained after the piston has driven the gas into compressed condition ready for firing is lower as the atmospheric pressure drops. This means that there is not so much power in the compressed charge of gas the higher up you get above sea level. The writer has heard it said by persons who live and do much driving in the mountains that an engine loses 25 per cent of its power efficiency when it is working at an altitude of 7000 feet as compared with sea level, and that this loss is correspondingly greater as one goes above the 7000-foot mark.

Running the Carburetor Scale

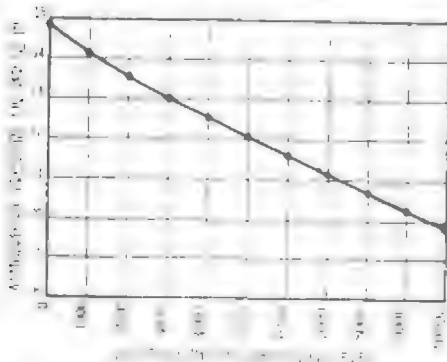
Since there is no mean constant to go by it is not possible to tell you the best carburetor setting for mountain driving. This differs in accordance with the heights to which you go. One thing is certain; you will find adjustment of your carburetor imperative when you change from plains to mountain driving. The air opening will have to be increased and likewise the gasoline supply. It may be you will find it necessary to work from the smallest opening to the largest and back until the right adjustment is secured. There is a point that may be taken as the best combination,

but it must be worked out to correspond with the altitude.

The danger of engine overheating becomes more pronounced as you drive into higher altitudes. Notwithstanding the fact that the air becomes colder the higher up you go, water boils more quickly the higher the altitude, and although it boils it is not so hot as when it boils at sea level. This is explained by the thinness of the atmosphere and the formula worked out by the Greeks for figuring the height of mountains may be taken as a basis from which to determine the effect of altitude on boiling points of water. By using a finely graduated thermometer and taking the temperature at which water boiled at various points on the mountain and then measuring the exact distance, they found that every 555 feet of altitude lowered the boiling point of the water 1 deg. Thus in computing the heights of greater mountains they had only to boil water at the summit, find the boiling point, subtract that from 212 deg.—sea level boiling point of water—and multiply this difference by 555 and they obtained the height of the mountain above sea level.

Difference in Boiling Point

Proceeding on this theory you find that at an altitude of 10,000 ft. the water in the radiator of your car boils at 192 deg. instead of 212. At 14,000 ft., or the top of Pike's Peak, it would boil at about 184 deg. Before beginning to climb mountains by motor car it will be well to see that your radiator is well filled because filling stations are none too plentiful, although there often is a stream or a spring which supplies the need for additional water. Boiling water never gets hotter than the boiling point. Of course, steam can be superheated and the temperature raised much higher, but if the supply of water in your radiator is plentiful and circulates well, even if it does reach the boiling point in mountain driving it does not necessarily mean that you have overheated the engine because the boiling point of the water at that altitude may be near the 190 deg. mark, which is looked upon as the most efficient point of many engines. It is essential, however, that when your radiator



Curve showing approximately how the atmospheric pressure drops as the height above sea level increases

Week-End Tours

The volume of information which Motor Age has received with reference to short tours for week-ends or holidays throughout the country is such that they cannot all be included in this issue. We shall continue to publish them throughout the touring season, taking up various cities each week and outlining the possible tours that may be taken from each.

boils you stop and allow it to cool either by adding more water or otherwise.

Perhaps the most essential knowledge to have in your equipment when you drive through the mountains is how properly to check your speed on down grades. Going up your greatest concern need be only that of the preservation of your car, but in going down you have the preservation of your life and the lives of others in your car and perhaps in other cars in your hands. This came to me quite clearly on the downward trip. While we were gliding along with ease and with no apparent strain on our car we came upon many cars, heavily loaded that had smoke rolling from their brake drums.

Using Engine as a Brake

Notwithstanding frequently voiced opinions to the contrary, it is the writer's opinion that the ideal way to brake your car when descending steep mountain grades is by throwing off the ignition switch and using the engine as a brake. This is almost universal practice in mountain districts.

If you want to get the greatest braking power from the engine, throw your gear-shift lever into low. Then the weight of the car turning the wheels meets greater resistance since through the low gear the engine must be turned over more rapidly and fighting the compression will be more difficult for the engine.

It may be well to explain the effect of braking with the clutch in; that is the strain that is put on the working parts. If the engine only is used as a brake there is no harm likely to result, but it is evident that a sudden application of the brakes when the clutch is fighting compression is going to lash against the gears, universals, goarset and engine itself with a strain that is far more severe than even quick application of power by opening the throttle.

When the clutch is engaged and the brakes left alone there is going to be no harm done to the working parts if the ignition is cut out and the throttle fully closed to create braking. As an emergency measure, it is advisable to sacrifice the car to whatever extent it may be found necessary as a measure of safety.

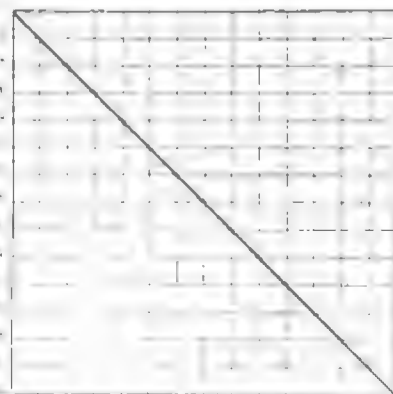
Remember that your brakes are the guardians of your life on mountain roads. These roads are never so good that you can take grades on the fly like you can hills in the less or non-mountainous country. Fre-

quently you find hills in the latter sections where there is an unobstructed view of the bottom and for a considerable distance beyond and you can let momentum carry you to the bottom and well up the next grade. The mountains present a much different problem. At times you have only a few feet of the road under observation and just beyond the ledge of rock that juts out and cuts off vision of what is just around the turn may be another car or a wagon or team with no room for you to pass. Think what long punishment of your brakes might mean if called upon to stop in an emergency like that. If you are coasting with your engine as your brake, you have your car under control and it is an emergency like this that was meant when we said that braking with the clutch is justified as a measure of safety.

Who Has Right-of-Way

You may be called upon to reverse a considerable distance if you should meet a team on a mountain road. Never think you are doing more than your share if the place to which you must back to is more distant than that behind the team. Any distance within reason is not too far, rather than to require the owner or driver of the team to do much backing. You can direct the course of your car in reverse much more nearly in a desired course than can the driver of a team. Besides you are, or may be, reversing up hill and you have the weight of the car in your favor, while the team, being backed down hill, is an uncertain quantity, which, on a narrow road, is a doubly uncertain quantity when it comes to backing in any desired course.

Remember that in meeting a team on a mountain road, the team should be given the inside track. Unless you have driven in the mountains you cannot appreciate what it means to pass another vehicle at a point where the extreme width of the road at the point of passage does not exceed 10 feet. It means care and caution; a slip may not end there. More likely it may end some thousand or more feet below in some raging stream or on the jagged rocks at the bottom of the canyon.



Curve showing how the boiling point of water lowers as the altitude increases









Town	SPEED LIMITS		OFFICERS' SIGNALS		DRIVERS' SIGNALS			STOPPING			PARKING		HEADLIGHTS			
	Residence	Downtown	Crossings	N. & S. Pro.	E. & W. Pro.	Stop	Turn	Slow	Street Cars, Feet	From Hydrants, Feet	From Corner, Feet	Time Restrictions	Position at Curb	Right of Way	Dimmer Provision	Light Beam Distance, Feet
MASSACHUSETTS—																
Macon	15		7	1 blast	2 blasts	Arm	Arm			15	30			N. & S.	Dimmer	200
Savannah	15		5-8			Arm	Arm				10				Dimmer	
Waycross	15						Arm									
IDAHO—																
Boise	10-15		4-7			Arm	Arm	Arm	6				30°		Dimmer	200
Lewiston	20	15		1 blast	2 blasts	Arm	Arm								Dimmer	200
Pocatello	18		10	1 blast	2 blasts	Arm	Arm			10	30				Dimmer	Beas.
ILLINOIS—																
Quincy	15	10	6						6		10			E. & W.	Dimmer	200
Peoria			6			Arm	Arm	Arm		15	10	60 min.	Parallel	Left	Dimmer	200
Decatur	15	10	6			Arm	Arm	Arm	6	15	10	60 min.	45°	N. & S.	Dimmer	200
Elgin			1 blast	2 blasts	Arm	Arm							Parallel	N. & S.	Dimmer	100
Bloomington	15	10	6			Arm	Arm				10			N. & S.	Dimmer	200
Chicago	15	10	6	1 blast	2 blasts	Arm	Arm	Arm	10			30 min.	Parallel		Dimmer	200
Aurora	15	10	6	1 blast	2 blasts	Arm	Arm		15					E. & W.	Dimmer	200
Cairo	15	10	6								15			N. & S.	Dimmer	200
Rockford	15	10	6	1 blast	2 blasts							30 min.				200
Joliet	15	10	6			Arm	Arm	Arm								Beas.
Galesburg	15	10	6			Arm	Arm	Arm	6	15	10			E. & W.	Dimmer	200
Champaign	15	10	6			Arm	Arm			20				Right	Dimmer	200
Springfield										10	10			N. & S.	Dimmer	
Paris							Arm				10		45°	N. & S.	Dimmer	
INDIANA—																
Evansville	15	10	6			Arm		Arm	4					N. & S.		
Lafayette						Arm	Arm		10					N. & S.		
Lafayette	10					Arm	Arm			15			45°	N. & S.	Dimmer	200
Indianapolis			6											N. & S.		
South Bend							Arm		10					N. & S.	Dimmer	200
Port Wayne				1 blast	2 blasts	Arm	Arm		10	30				N. & S.	Dimmer	200
Elkhart						Arm	Arm		6	15				N. & S.		
Muncie	15	8		1 blast	2 blasts	Arm	Arm	Arm	2					E. & W.		
IOWA—																
Waterloo	15					Arm	Arm		15	20				Right	Dimmer	500
Cedar Rapids	15					Arm	Arm			20						
Mason City	15	10				Arm	Arm			30					Dimmer	500
Ottumwa	20	10	6							30		30 min.				
Des Moines	20	12				Arm	Arm					30 min.			Dimmer	75
Davenport			5			Arm	Arm	Arm	10	20				Right		
Burlington	15					Arm	Arm		6	20				Right		
Port Dodge	15	10	4			Arm	Arm	Arm	6					E. & W.		
Council Bluffs	15	10								20						
KANSAS—																
Wichita	12	12	6			Arm	Arm	Arm	10				45°		Dimmer	150
Topeka	15	15	6			Arm	Arm	Arm	5	15					Dimmer	50
Atchison	12	12	6			Arm	Arm								Dimmer	200
Hutchinson	12		6							20	20			N. & S.	Dimmer	Beas.
Leavenworth	15	10	Beas.													Beas.
KENTUCKY—																
Frankfort	12	8		1 blast	2 blasts					10	10		30°		Dimmer	200
Owensboro	15	10	8			Arm	Arm	Arm								200
Lexington	15	12	8	1 blast	2 blasts	Arm	Arm	Arm				30 min.				200
Louisville	15	10	8				Arm		6		60			E. & W.	Dimmer	200
Covington	15	10	8							30	30				Dimmer	200
LOUISIANA—																
Lake Charles	15	8							10		10				Dimmer	
New Orleans	20	10		1 blast	2 blasts	Arm	Arm	Arm	6					N. & S.		150
MAINE—																
Augusta						Arm		Arm							Dimmer	
Biddeford	15		8			Arm		Arm		10	10					
MARYLAND—																
Cumberland	15	12	6			Arm	Arm	Arm	15	15				N. & S.	Dimmer	
Annapolis	12								11						Dimmer	
Baltimore										10						
Cambridge	12		6				Arm								Dimmer	200
Frederick	18	12		1 blast	2 blasts					30				N. & S.		200
MASSACHUSETTS—																
Worcester	20	15	8			Arm	Arm	Arm				1 hour				
Pittsfield						Arm	Arm	Arm					45°			
Greenfield						Arm	Arm	Arm					Parallel			
Springfield						Arm	Arm	Arm		10		10 min.		N. & S.		
Boston	15		8			Arm	Arm	Arm			10					
MICHIGAN—																
Detroit	15	10														
MINNESOTA—																
St. Cloud						Arm	Arm	Arm				1 hour		Avenues		
Duluth	15		7-8						10			30 min.			Dimmer	200
Minneapolis	15	10	6			Arm	Arm	Arm	10	15		30 min.		Avenues		200
St. Paul	20	10	5						10			30 min.				
Mankato	15	10	6			Arm	Arm	Arm		10						200
MISSISSIPPI—																
Columbus	15	10	8											Avenues		
Jackson	12															
Vicksburg	15	10	6			Arm	Arm	Arm							Dimmers	
MISSOURI—																
Cape Girardeau	15		6												Dimmer	200
Carthage	14	10														200
Springfield	20	10	12			Arm	Arm		10	15					Dimmer	150
St. Louis	10	8			Arm with Traffic	Arm	Arm	Arm				2 hours		E. & W.		300
Jeppia	20	12	10			Arm	Arm	Arm	10	15		60 min.	45°	N. & S.	Dimmer	200
St. Joseph	15	12							10			15 min.		N. & S.		200
Kansas City	20	12	10			Arm	Arm	Arm			10	60 min.	Parallel		Dimmer	300
Bedalia	15	10														200
MONTANA—																
Anaconda	20		12			Arm	Arm	Arm							Dimmer	
Miles City										15			45°		Dimmer	
Billings	15	12				Arm	Arm	Arm				30 min.	Parallel	E. & W.	Dimmer	150
Boseman	20	15				Arm	Arm							N. & S.		
Kalispell	15									30						
Helena	12	8														
Livingston	12	8														
NEBRASKA—																
Beatrice	12		6			Audible or Visible					10					
Lincoln	12	8				Audible or Visible									Dimmer	Beas.
Omaha	20	12	8			Arm	Arm	Arm				30 min.	45°		Dimmer	100
Fremont		10	8											E. & W.		
NEVADA—																
Reno	15	12	8			Visible or Audible			4							
NEW HAMPSHIRE—																
Portsmouth						Arm	Arm	Arm	10							
Manchester	20	12	10			Arm	Arm	Arm								

Features of City Traffic Ordinances of Importance to Tourists

	SPEED LIMITS		OFFICERS' SIGNALS		DRIVERS' SIGNALS			STOPPING			PARKING		HEADLIGHTS			
Towns	Residence	Downtown	Crossings	N. & S. Pro.	E. & W. Pro.	Stop	Turn	Slow	Street Cars, Feet	From Hydrants, Feet	From Corner	Time Restrictions	Position at Curb	Right of Way	Dimmer Provision	Light Beam Distance, Feet
NEW JERSEY—																
Camden	12	8				Arm	Arm	Arm		10	10				Dimmer	250
Trenton	12	8														
Jersey City	12	8										30 min.				
NEW MEXICO—																
Albuquerque	15		5			Visible or Audible			10	20				N. & S.		500
Roswell	20	12	10													
NEW YORK—																
New York City	Reas.	Under 30		1 blast	2 blasts	Arm	Arm	Arm	8	10				N. & S.		
Utica	15					Arm	Arm	Arm		10						300
Elmira	15			2 blasts	1 blast	Arm	Arm	Arm		20						200
Binghamton	15					Arm	Arm	Arm	4							Reas.
Rochester	18	10	8			Arm	Arm	Arm	6	10	25				Dimmer	300
Buffalo	15	12	5			Arm	Arm	Arm	10	15	15				Dimmer	200
N. CAROLINA—																
Raleigh	15	8	5													
Asheville	15	10	7									15 min.			Dimmer	
Winston-Salem	15	10	7			Visible or Audible						15 min.		Right		400
N. DAKOTA—																
Minot	10		7			Arm	Arm	Arm						E. & W.	Dimmer	
Grand Forks	15	10	8			Arm	Arm	Arm	10		10	30 min.			Dimmer	200
Fargo	10		7			Arm	Arm	Arm								
Bismarck	8		6						10					E. & W.	Dimmer	300
OHIO—																
Hamilton						Arm			6	10				Right	Dimmer	200
Cincinnati	15	8		1 blast	2 blasts	Arm	Arm	Arm		18				Right		
Columbus	15	8								10	15			Right	Dimmer	200
Cleveland	15					Arm	Arm	Arm	6			30 min.		Right	Dimmer	200
Canton	15	8				Arm	Arm	Arm	8	30		90 min.		E. & W.	Dimmer	200
Dayton	15	8				Arm	Arm	Arm		10		30 min.			Dimmer	200
Youngstown	15	8							8	20	30				Dimmer	75
OREGON—																
Salem	20	15								20						
Portland	20	15	10	2 blasts	1 blast	Arm	Arm	Arm				60 min.	30°	Right	Dimmer	200
OKLAHOMA—																
Chickasha	15	10	8							10				N. & S.		
McAlester	20	12	6													
Armore	18	2	8						6	15						
Muskogee						Arm	Arm	Arm		15						200
Oklahoma City	15	8	8							20				N. & W.		
PENNSYLVANIA—																
Williamsport	25	15		2 blasts	1 blast	Arm	Arm	Arm		12				E. & W.		
Philadelphia	15			2 blasts	1 blast	Arm	Arm	Arm							Dimmer	200
Harrisburg	12			2 blasts	1 blast	Arm	Arm	Arm		10			45°	N. & S.		
Erie	15	10							10	20		45 min.		E. & W.	Dimmer	200
Johnstown	15										10	15 min.		Right	Dimmer	
Altoona						Arm	Arm	Arm	8	10		10 min.		Avenues	Dimmer	75
Pittsburgh	24	12	8			Arm	Arm	Arm				30 min.			Dimmer	
RHODE ISLAND—																
Newport						Arm		Arm			10					
Pawtucket						Arm	Arm	Arm			10				Dimmer	
S. CAROLINA—																
Columbia	15		4	2 blasts	1 blast	Arm	Arm	Arm		10		15 min.		N. & S.	Dimmer	300
Charleston	15	10	8			Visible or Audible			8	40				N. & S.		300
S. DAKOTA—																
Lead	15		8								15					
Aberdeen	15	8	8				Arm		10		15					
TENNESSEE—																
Memphis	12	10		2 blasts	1 blast	Arm	Arm	Arm		15		15 min.		N. & S.	Dimmer	
Knoxville	15	10				Arm		Arm		20		20 min.				100
Nashville	15	9	8-9							15				E. & W.	Dimmer	200
Jackson	15	12	8			Arm	Arm	Arm						N. & S.		
TEXAS—																
Austin	18	12	4									20 min.		N. & S.	Dimmer	
Beaumont	18	15	8			Arm		Arm								
Galveston	18	15												N. & S.	Dimmer	200
Amarillo	15	6				Arm	Arm	Arm	6	20				N. & S.	Dimmer	300
El Paso	18	12	8			Arm	Arm	Arm	10	8	10	20 min.		Right	Dimmer	15 C.P.
Houston	18	10	5											N. & S.	Dimmer	200
San Antonio	18	10	5	1 blast	2 blasts	Arm	Arm	Arm		10	20					200
Fort Worth	18	12				Arm	Arm	Arm		10		45 min.		N. & S.	Dimmer	200
UTAH—																
Salt Lake City	Reas.			1 blast	2 blasts	Arm	Arm	Arm		10				Right	Dimmer	Reas.
Ogden	Reas.															
VERMONT—																
Burlington	10					Arm	Arm									200
VIRGINIA—																
Norfolk															Dimmer	300
Fredericksburg	15	12	8			Arm	Arm	Arm			20					
Lynchburg	15	10	5			Arm	Arm	Arm								Reas.
Roanoke	14	10	6								20				Dimmer	300
Richmond	20	15	7			Arm	Arm	Arm	8	10			45°	E. & W.		105
WASHINGTON—																
Seattle	20	6	8	1 blast	2 blasts	Arm	Arm	Arm				30 min.		Right		
Walla Walla	18	12								6						200
Spokane	20	15				Arm	Arm	Arm		20				N. & S.		150
Tacoma	20	15	6			Arm	Arm	Arm		25	10				Dimmer	200
W. VIRGINIA—																
Wheeling	15		6							10				N. & S.		75
Charleston	15	10	5			Arm	Arm	Arm								Reas.
WISCONSIN—																
Milwaukee	15		8			Arm	Arm	Arm			10				No spotlights	
Madison	15		Reas.			Arm	Arm	Arm		15					Dimmer	200
Eau Claire	15		Reas.						10	20		5 min.			Dimmer	
Racine	15		7			Arm		Arm								200
Sheshogan	15		Reas.											Right		
Stevens Point	15		Reas.							15						
WYOMING—																
Cheyenne	18	10	6			Visible or Audible									Dimmer	200
Laramie	18	15	10											Right	Dimmer	200
Cody	12		8													
Washington, D. C.	15	12	6			Arm	Arm	Arm		5-15		10 min.		N. & S.		200



















Motor Roads of the U. S.

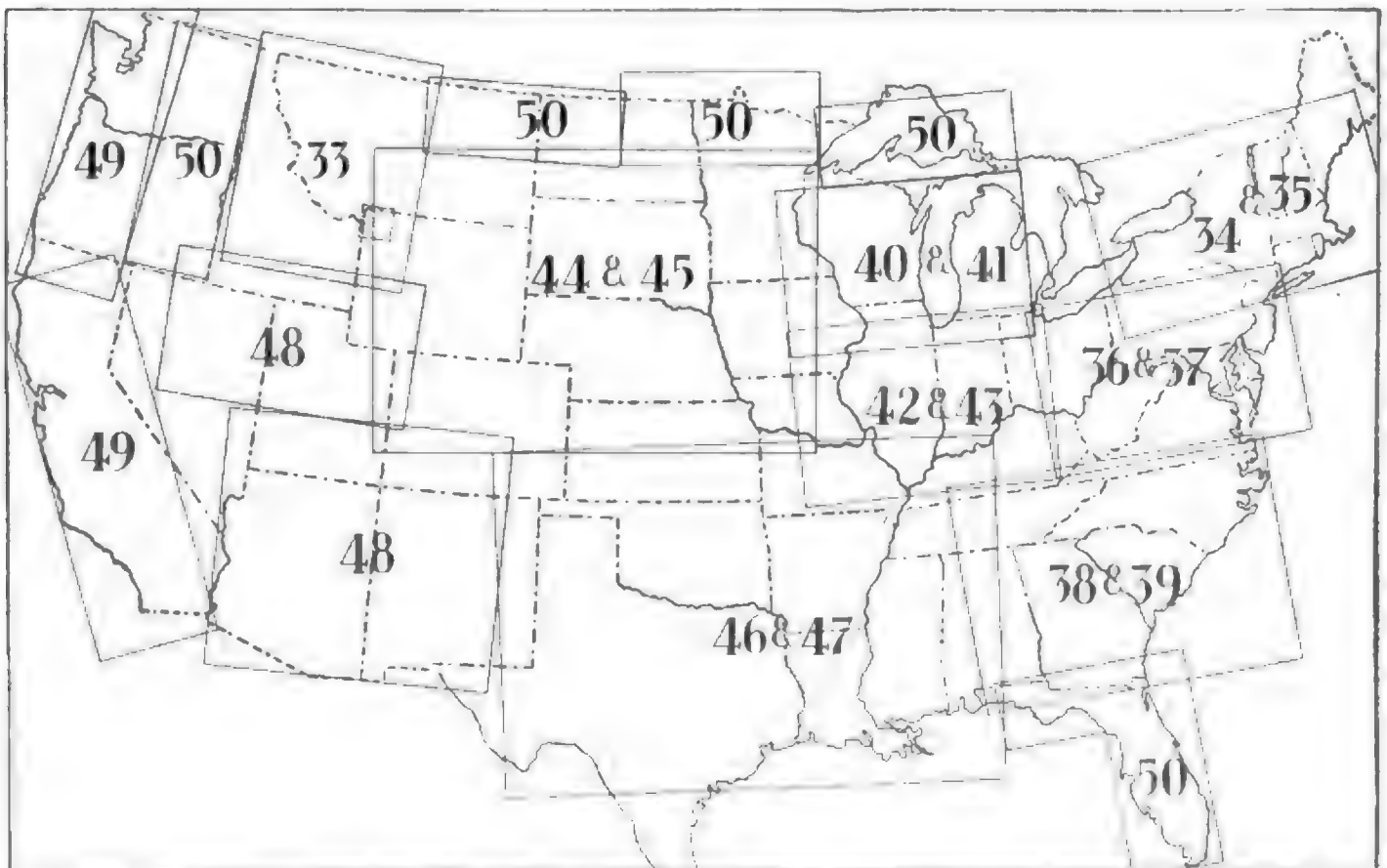
Main Highways and Their Connecting Lines

MAPPING the highway system of the United States in the short space of three months makes it requisite that every possible authority be consulted. If one man were to attempt to cover every mile of highway in the United States by motor car and traveled at the daily average of 200 miles, 365 days in the year, it would take him 33.6 years to complete our 2,451,660 miles of roads. Even then, if the country had its annual average of new road building, there would be an accumulation of sufficient new mileage in those 33.6 years to keep him traveling 7.4 years longer, so it is evident that charting our highways is a task that must be done from information gotten from all sources, rather than a few, if it is to be up to date.

Three months ago we began collecting road data from every county of every state in the Union. As this data was received it was transferred to sectional maps of the United States, and by solicitation of the motoring public throughout the length and breadth of our country we have been

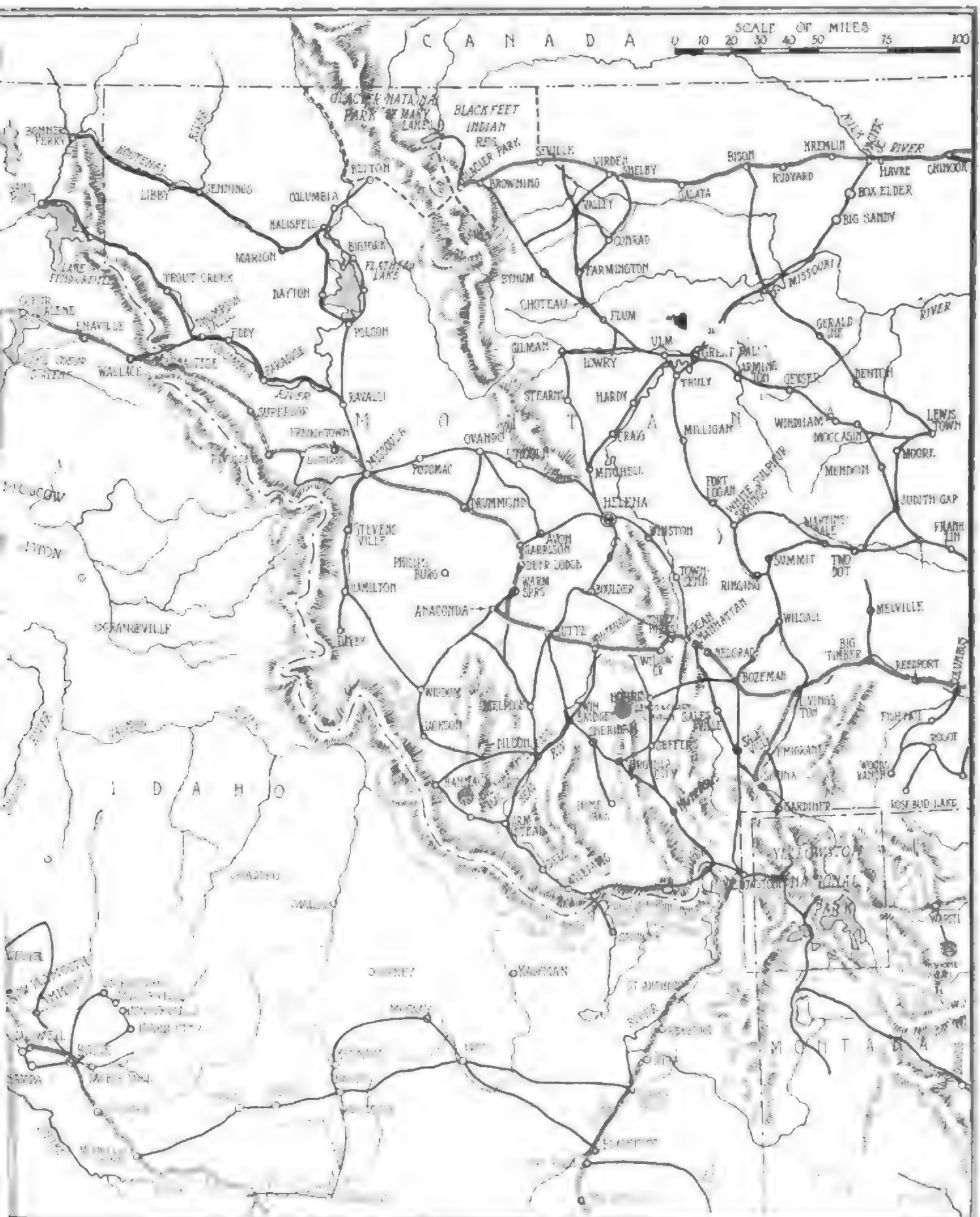
able to chart the main motor roads that offer touring possibilities. So comprehensive is this information that to place it all on one big map would make it cumbersome, therefore we have divided the country into sections as shown on the map below. Each of these divisions represents either a one- or two-page section map shown on the pages that follow, and in which the main trunk lines are indicated in red and the connecting and feeder roads in black. With these maps it will be possible for the motorist to plan a tour of any length and passing through any of the cities he chooses.

Readers of MOTOR AGE have been practicing the Golden Rule all winter. They have been sending in the best weekend and holiday tours originating in their respective localities. All of this information has been brought together, so that the motorist who mapped the best roads for short tours out of his city in return gets similar information from every part of the country. These maps should be preserved. They will be valuable throughout the touring season, yes, indefinitely.



This map shows the boundaries of the sections that correspond with the page number marked hereon and which represent logical touring sections, either because of geographical conditions or distribution of population

Road Connections in Glacier-Yellowstone District



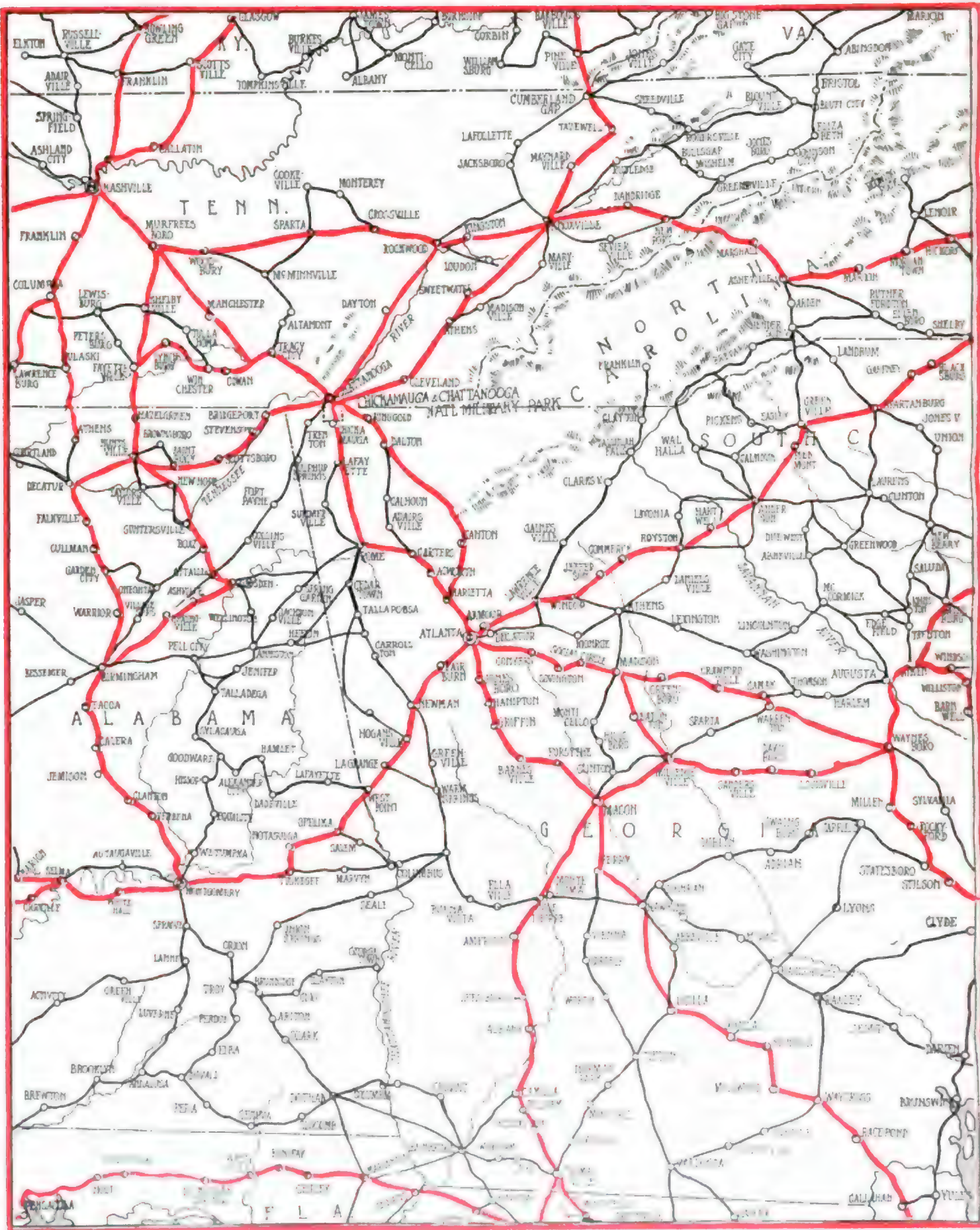






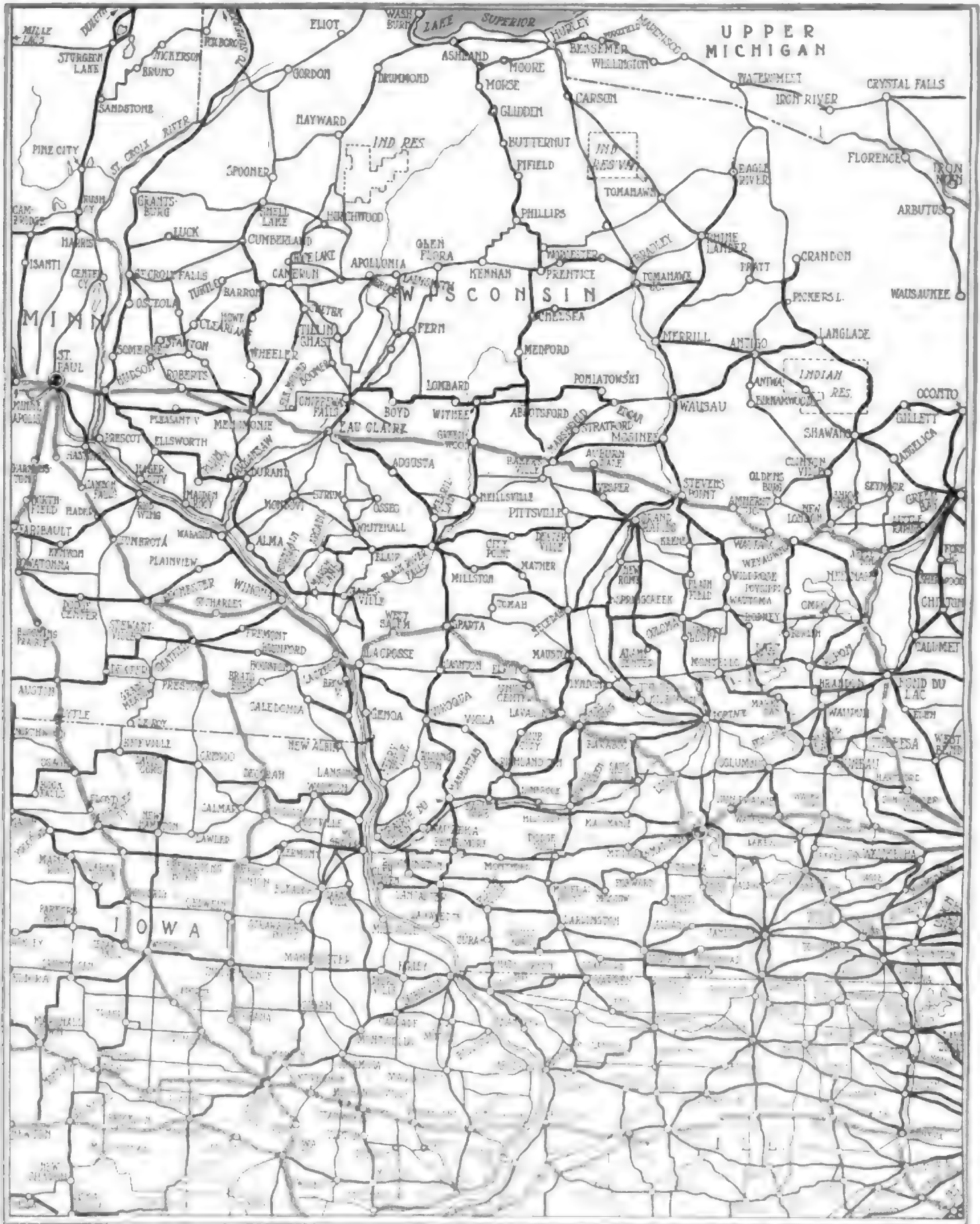


Dixie Land's Thoroughfares Through the Civil War



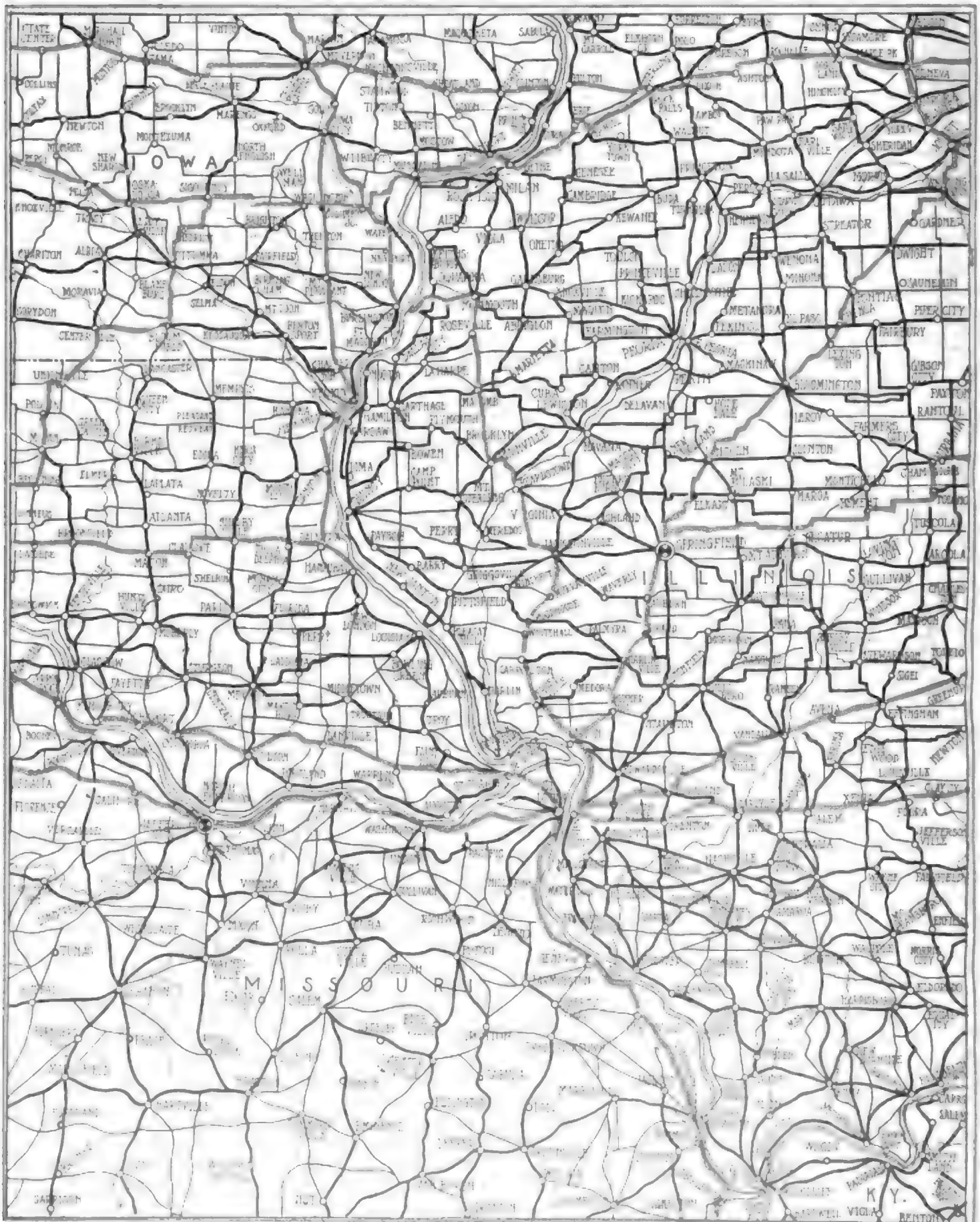


Highways by Which Resort Sections of Wisconsin





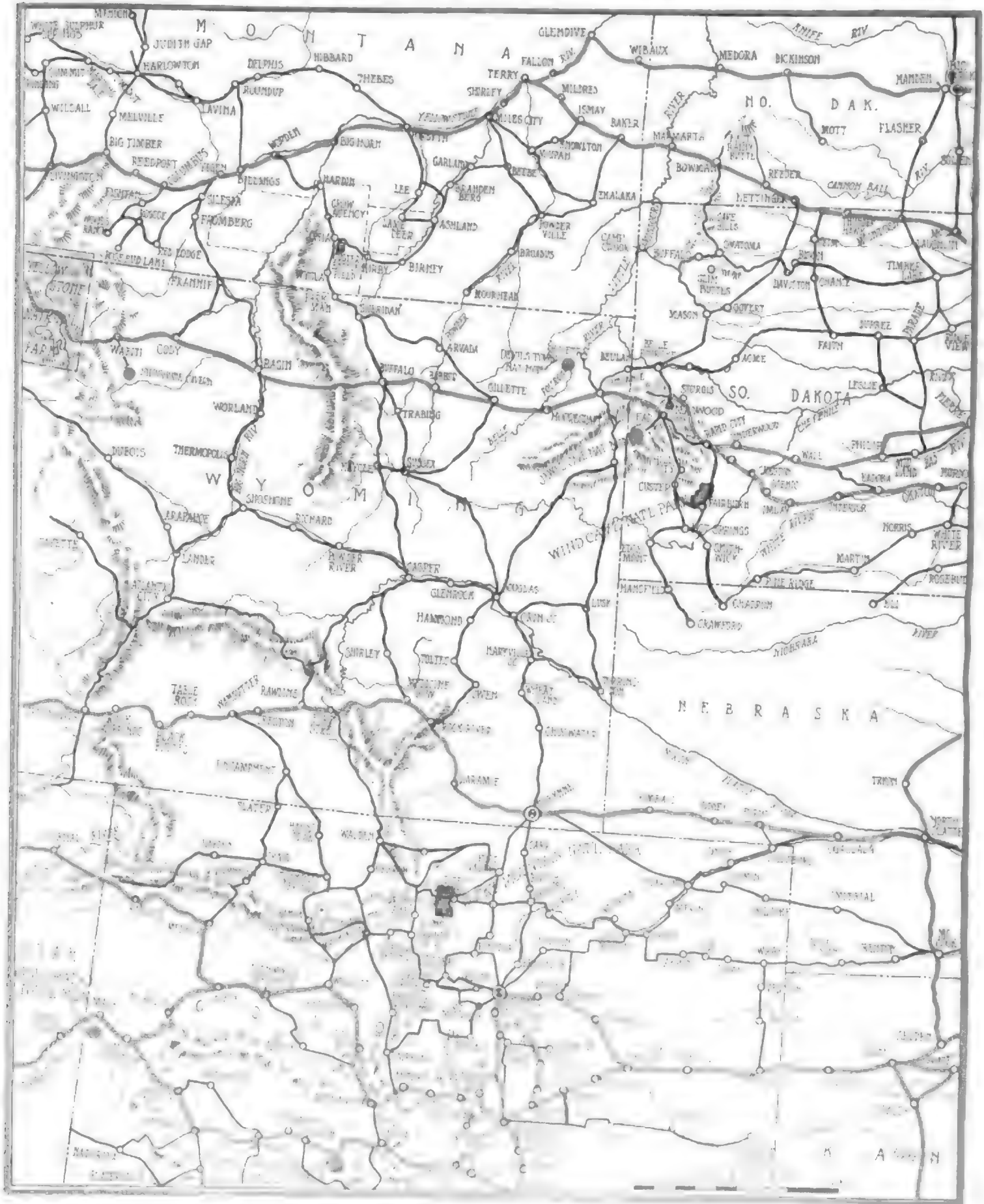
Major Highways and Their Connecting Routes in the



Central Agricultural Section -- Indiana, Illinois, Iowa



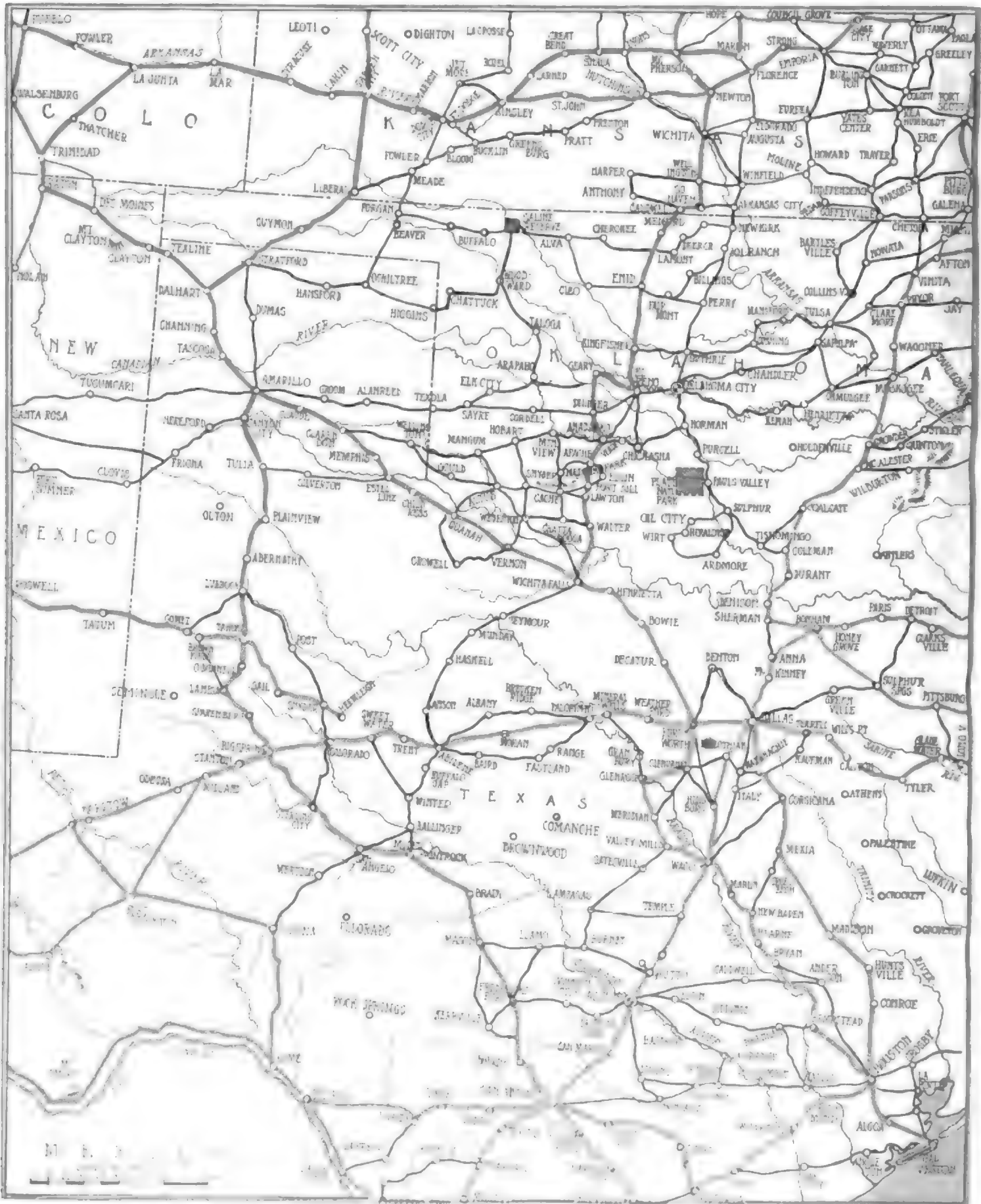
Main Highways and Feeder Roads in the Dakotas,



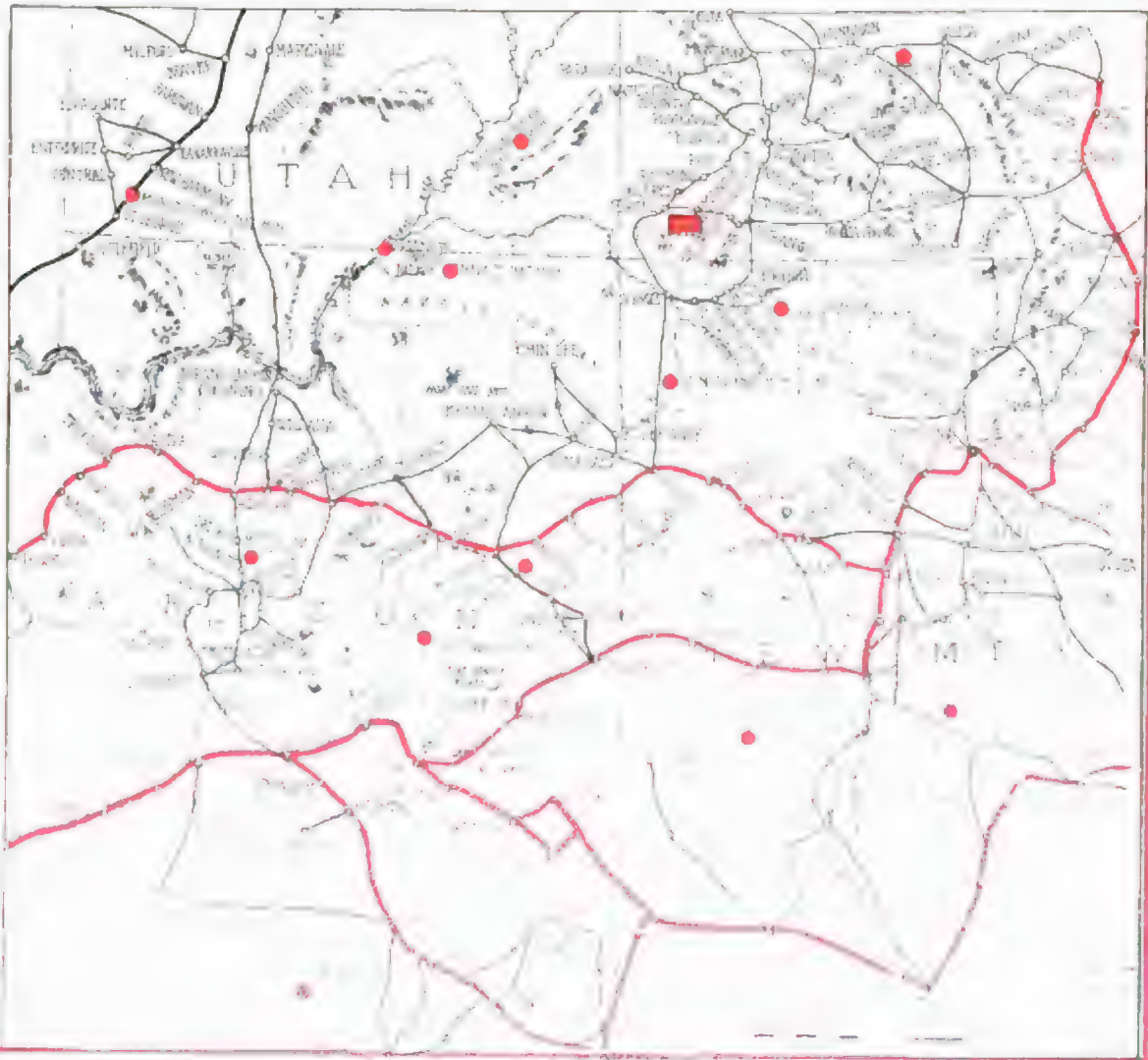
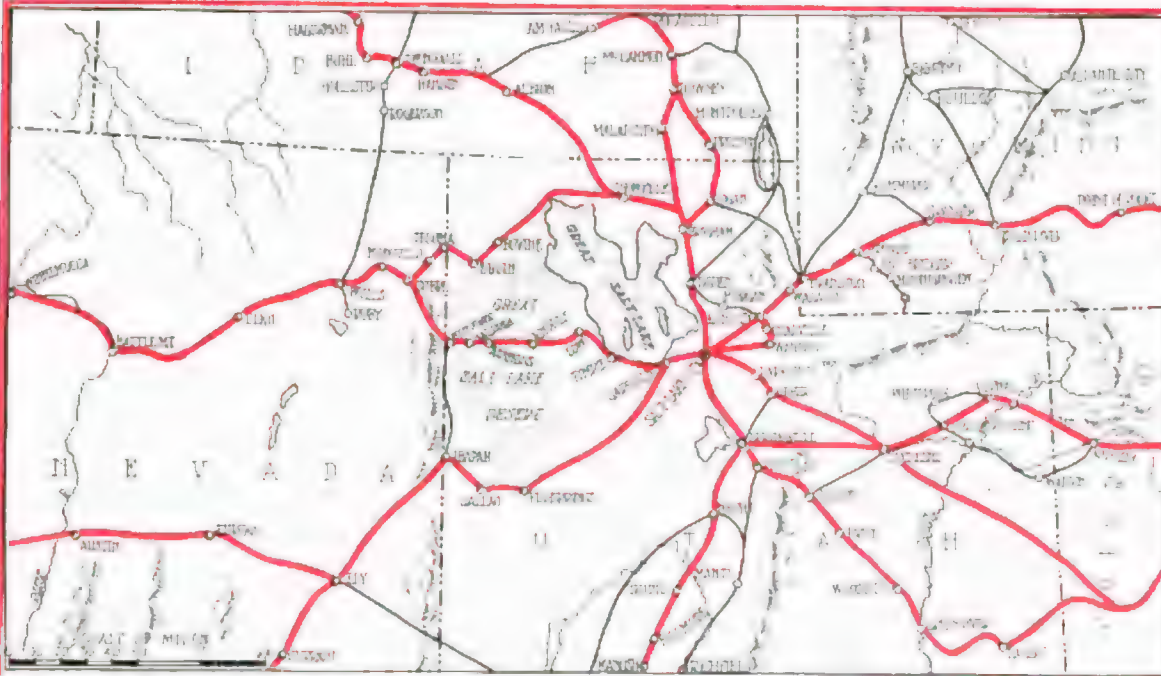
Nebraska, Kansas, Missouri, Iowa and Minnesota



Highways That Connect Our Gulf Coast and the




Main and Connecting Roads in Our Indian Section



Week-End and Holiday Tours

Suggested by and for Readers of Motor Age

 **U**ST now our thoughts are of the possible tours you can make over the week-end, Decoration Day, Fourth of July, etc., or you may be contemplating a long cross-country tour and your mind is unsettled as to what side trips you should make; what points of interest there may be just a short distance off the main highway you intend to drive and which you do not want to miss. On the pages that follow is a comprehensive guide for short tours or side trips from the main named highways. Undoubtedly you had some part in outlining these short tours. These suggested trips represent what the Motor Age family of readers believe to be some of the best the country has to offer with their home city or town as the originating point.

While we always have had the co-operation of our readers, highway associations, motor clubs, state highway departments and other organizations that have to do with motor roads in collecting information, we wish to say frankly that never before have we felt the motoring pulse of the country and found it so vigorous in response to our request for the best short tours throughout the Union.

We asked our readers and others to join us in making this issue the most

comprehensive compilation of touring information ever brought together in one number of any magazine. We asked for two or three maps outlining trips from their

home towns; some of them sent as many as twelve. Such a volume of valuable data has been received that we find we cannot publish all of the suggested tours at this time, yet most of the tours have been incorporated in the maps which precede this page. However, during the coming touring season we shall give each week a number of suggested short tours from various cities that could not be adequately covered in this issue. The sectional maps herein will be valuable in tracing the touring information we give you during the coming summer. Every reader of Motor Age should feel his debt to every other reader who has so generously responded to the fall for road information, for in no other way would it have been possible to give you such practical data in so comprehensive a form, except for our readers' assistance.

The big supplement map may be used in conjunction with the eighteen pages of sectional maps for outlining long trips. On the large map all the named highways are shown. These link the sectional maps, which are to be used with the data on the pages following this.

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Painted rocks near Ellensburg, Wash. These rocks represent the symbols and colorings of the Indian totem pole

practical dirt road extends from Suffolk to Edentown, thus offering an alternate return from Norfolk.

Richmond

There is hardly a city in the country so rich in colonial memories as Richmond, Va. The site was owned by the Indian chief whose daughter, Pocahontas, saved the life of John Smith. It was founded in 1737, and was made the capital of the state in 1779. In 1861, it became the capital of the Confederate States of America, and remained uncaptured for four years of attempts on the part of the Union Army. St. John's Church, besides being a very old one, is the one in which Patrick Henry gave his famous "Give me liberty or give me death" speech. To name all the historical points of interest would be a practically endless job.

1—Around Richmond, all within a distance of about 20 miles from the city, are noted battlefields, in which there is much interest. The Battle of Seven Pines was fought May 31, 1862, about five miles from Richmond. Seven days' battle occurred at Mechanicsville, Cold Harbor, Savage Station, Glendale, and Malvern Hill. All, or as many of these places as the motorists might wish to visit at one time, can constitute a one-day tour.

2—The motorist naturally goes from Richmond, Va., to Washington, D. C. This is a tour of 133 miles, one way, and the length of the tour depends more on the time spent in the cities than on the possibilities of making a quick trip. The route is by Fredericksburg, another historical center, and the Chopawamsic Swamp, and leads through Ashland, Coatesville, Manako, Childsburg, Portlow, Spottsylvania, Fredericksburg, Falmouth, Mountain View, Garrisonville, Dumfries, Occoquan, Loreton, Accatonik and Alexandria.

3—Richmond to Norfolk, 99 miles, is a route through one of the most historical sections of America. Hardly a mile but what some reminder of the struggle between the states is present. The route is Richmond, New Kent, Barhamsville, Toano, Williamsburg, Denbigh, Newport News and Sewells Point, where you ferry across Hampton Roads.

4—Richmond to Charlottesville, Va.—The

route runs through several small towns until it reaches Charlottesville, 83 miles away. Near Charlottesville is Monticello, the home of Thomas Jefferson, and not far away is Ashlawn, the farm of James Monroe.

Roanoke

1—To the Natural Bridge, 125 miles. Traveling northward through rich farming and fruit lands and the city of Buchanan, the great Natural Bridge is reached, 39 miles from Roanoke. Excellent hotel accommodations are available and the scenery is unusually beautiful. The tourist may continue 14 miles farther to Lexington, which is rich in historical interest. It is the home of Washington-Lee University and the military institute. It also contains the tombs of Generals Lee and Jackson. Westward 25 miles is Clifton Forge in the Allegheny mountains. The return to Roanoke is made over a fair road, a part of it lying along the James river.

2—To Lynchburg, 115 miles. This trip leads eastward, passing through Blue Ridge Springs, an old and celebrated summer resort. The Peaks of Otter are the next in interest. These twin mountains have long been on the itinerary of tourists and afford a remarkable view. At Bedford, next, may be seen the magnificent National Home of the Order of Elks. This town is also rich with historical interest. Lynchburg, boasting a population of 30,000 and prosperous manufacturing interests, is next reached. Northwest of Lynchburg along the James river, the road passes to Natural Bridge, thence to Roanoke by way of Buchanan, as referred to in route No. 1.

Staunton

1—To the Natural Bridge, 50 miles. This route passes Lexington, rich in historic interest and containing the military institute and Washington-Lee university.

2—To Winchester, 110 miles. Fort Defiance is the first point of interest where a side trip may be made to the grottoes of the Shenandoah Valley. Proceeding, the towns of Harrisonburg and Newmarket are reached, from which latter place an 18-mile side trip may be made to the Louray Caverns. Winchester is 49 miles beyond Newmarket.

3—To Deerfield, 18 miles. From Deerfield the trip may be extended in a westerly direction 29 miles to the town of Monterey, or in a south-westerly direction to Hot Springs, 49 miles distant.

Washington

Seattle

Seattle, Wash., and Puget Sound, is the western terminus of the Yellowstone trail. It is also the junction point of the Pacific highway, extending north to Vancouver, B. C., and south to San Diego, Cal. Trips along this highway, either north or south, are rich in scenic views. The trip from Seattle south by the Pacific highway to Olympia, and then by Olympic highway to the Olympian Peninsula, and Lake Crescent Tavern, is probably one of the most attractive in this section. The highway on the Olympian Peninsula is a vacation resort.

1—Perhaps the best trip embracing a portion of the Yellowstone trail out of Seattle would be a trip to Snoqualmie Pass, about 63 miles, which takes the motorist past one of the most magnificent waterfalls of the Northwest, into the heart of the great forest of the cascades.

2—An ideal trip in the Northwest is that known as the Georgian Circuit. This embraces the entire Puget Sound district, leaving Seattle and following the Pacific highway, then by ferry from Victoria on Vancouver Island across to Port Angeles, returning by the Olympic highway to Olympia and then by the Pacific highway to Seattle. This is a trip of about 600 miles.

3—To go to Rainier National Park from Seattle, follow the Pacific highway to Tacoma, from which place a good road leads to the park entrance, 108 miles from Seattle.

4—Go by the Pacific highway north to Everett, cross to Arlington and return by Snohomish and Bothell. The roads are somewhat off the beaten path, but are in good condition. The scenery is varied and beautiful and the approximate number of miles is 80.

5—A 174-mile tour is north on the Pacific highway to Bellingham, then to Sumas, crossing the international border and continuing on to Chilliwack, B. C. Ferry across Fraser river, from Rosedale to Gasist, and continue on to the springs.

6—To go to Whidby Island, follow the Pacific highway north to Mount Vernon, cross Skagit river, and go through Dewey and Deception Pass to Cornet. You can return by Commans Island and Stanwood or you might take the road to Marblemouth from Mount Vernon.

7—A one-day trip gives a choice of roads to Monroe and from there a direct road leads to Index. It is 75 miles by Everett and 56 by Woodenville.

8—A round trip of 128 miles leads to Enumclaw and Cedar River Valley and returns by Black Diamond, Ravendale and Renton.

Spokane

1—Perhaps the most interesting of all the trips around Spokane is that through the lake region to the east, then through the Coeur d'Alenes and then on into Montana to Missoula, Mont. A side trip of 50 miles to Glacier National Park may be made from Kallispell. The route is Spokane, Coeur d'Alene, 34 miles; Wallace, 87 miles; Missoula, 220 miles; Kallispell, 349 miles; Bonner's Ferry, 511 miles; Sand Point, 544 miles; back to Spokane, 612 miles.

2—Another loop possible from Spokane is that to Waterville, 145 miles; Wenatchee, 173 miles; through Davenport, 37 miles; Wilbur, 73 miles; Ellensburg, 240 miles; North Yakima, 280 miles; Prosser, 340 miles; Pasco, 375 miles; Walla Walla, 425 miles; Colfax, 524 miles, and back to Spokane, 587 miles.

3—A one-day circle tour is through Chat-

5—One of the trips through the lake region possible from Eau Claire is through Lake Hallie, Chippewa Falls, 12 miles, Lake Chetteck, 30 miles, Rice Lake, 50 miles, Shell Lake, 90 miles, and Balsam Lake, back through St. Croix Falls, Turtle Lake and New Richmond. The trip can be lengthened or shortened by taking optional roads.

2—To Mason, 57 miles. The route embraces Gnyandot, Lesage, Greenbottom, McCurdy, Glenwood, Hogsett, Ben Lomond, Ewell, Beale, Gallipolis Ferry Sta., Henderson, Pt. Pleasant, Maggie, Spilman, West Columbia and Clifton.

Marshfield

1—A week-end trip from Marshfield, the geographical center of Wisconsin, can be taken over the Yellow trail through Stevens Point to Amherst and Waupaca, the region of the Wisconsin chain of lakes. The drive is about 75 miles each way.

2—Another week-end drive can be made to the northern lake regions over the Yellow trail to Colby through Medford, Chelsea, Rib Lake and Tomahawk, then south to Marrow, following the Wisconsin river to Warsaw, Mounee and Dancy, returning west through Rosellville back to Marshfield, making a trip of about 200 miles.

3—Another short tour is that from Marshfield to Pittsville and Grand Rapids, Nekeoma, Neecedah and Kilbourn, about 100 miles. This will take you to The Dells of Wisconsin.

4—Another one day trip may be taken by going west from Marshfield through Nelville, Greenwood and Owen, following the Yellow trail to Abbottsford, Colby, Unity and Spencer, back to Marshfield, about 85 miles.

Milwaukee

1—To go to Green Bay from Milwaukee you can go by Port Washington, Cedar Grove, Newton and Manitowoc and return by Appleton, Neenah and Oshkosh, which is on Lake Winnebago, coming in through Fond du Lac back to Milwaukee, or you can make a complete circuit of the lake before returning. It is 120 miles to Green Bay.

2—A shorter tour may be made by the Janesville Plank road to Lake Geneva, 49 miles from Milwaukee, and you can return by Rochester and Racine or, before reaching Racine, take the Kilbourn or Howell road, which will get you back more quickly.

3—Milwaukee, Beloit and Kenosha form a triangular circuit. A more direct route to Beloit and back to Milwaukee omits Kenosha, though. Take the Blue Mound road or Janesville Plank road to Beloit, and go to Kenosha from there through Elkhorn and Burlington. Beloit is 85 miles from Milwaukee, and Kenosha is 35 miles from Milwaukee. The distance between Beloit and Kenosha is a little more than 100 miles.

4—The Janesville Plank road and Blue Mound road make a circuit trip of between 72 and 74 miles one way from Milwaukee to Janesville.

5—To visit Madison and the state university, follow the Blue Mound road through Brookfield and Watertown, returning through Concord and Waukesha or, instead of returning directly from Madison, you can go on to Kilbourn and then return.

6—Milwaukee is only 90 miles from Chicago, and there are optional routes which make possible a circle tour. There is what is known as the short route by Racine, Kenosha and Highland Park, the route by Franklin, Orliss, Highland Park, Glencoe, Winnetka, Wilmette and Evanston and the inside route, and the best for fast trips, which comes through Everett Station, Ill., Wilmette and Evanston. All these routes are around 90 miles. A longer route is by Waukesha, Burlington, Libertyville and Milwaukee avenue. This is an important route, even though it is 120 miles long, because it serves as a connection for the summer resorts of the Menominee and Fox Lake section.

1—To Lake Geneva, 46 miles. Proceeding past the Forest Home cemetery on Muskego Ave., the following towns are traversed: Hales Corners, Tess Corners, Muskego, Denoon, Wind Lake, Waterford, across the Fox river to Rochester, Browns Lake, Burlington and Lyons.

Rhineland

Rhineland, Wis., is in the center of the northern Wisconsin lake region and has some 200 odd lakes in its vicinity. Ten or more trout streams are within a radius of 12 miles from Rhineland, and very few of the lakes are inaccessible to motor. Rhineland, Wis., is on the Wisconsin and Pelican rivers and is touched by Booms and Briggs lakes. Direct roads lead to Rhineland from Stevens Point and Green Bay. It is about 113 miles from Stevens Point, and farther from Green Bay. To sum up, 230 lakes and eleven trout streams within a 12-mile radius of Rhineland, together with an intricate system of intersecting roads, offer endless short tours with Rhineland as a center.

Wyoming

Cody

The main attraction from Cody is the Yellowstone National Park. Other trips take the motorist into the heart of the Rockies, but the main trip is that to the park. The road passes through the Shoshone canyon and over the dam, and you see that the road has been chiseled out of the rock. The stretch from Cody on to what is known as the Sylvan Pass, an elevation of 8500 ft., is a wonderful drive. At the top of the pass you can see the Teton mountains and the Yellowstone lake. The road is built by the government and is perfectly safe.

Fort Bridger

Fort Bridger is situated in a mountain valley, and the natural growth of trees in that section is a pleasant change from the gray stretches of plain and hill that surround it. Convenient camp grounds, as well as hotel accommodations, make short tours from it as a center agreeable. A half-day tour can be taken to Smith's Fork Canon, a camp in the pines at the foot of the mountains. You go south 12 miles to Robertson, then about 15 miles to the crossing of Smith's Fork, where it comes out of the canyon. This road is the nearest approach for motor cars to the Wasatch forest, one of the wildest and most beautiful and least known of our national forests. There is a fine view which can be obtained as you approach the mountains.

2—A 50-mile trip can be taken to the Bad Land fossil beds and the head of Beaver Creek. You go through Urle and Mountain View to the

top of the Smith Fork hill, from which you get a panorama view of the Bad Lands, which have given the museums of New York, Yale, Princeton and Pennsylvania great collections of fossils of the tertiary period. An old but good road runs north and south along the rim of what was a great lake basin. From Smith Fork Hill a run of 16 miles through the Bad Lands takes you to Lone Tree, from which there is a passable road to Hole in the Rock, 17 miles distant, where Beaver creek rises out of the mountains.

3—Fort Bridger is the nearest point on the Lincoln highway to Pinedale, Fremont Lake and the big game country, south of Jackson's Hole. This route is bordered by long stretches of sand and alkali, that lie farther to the east. It is 115 miles to Pinedale by Carter, Cumberland, Kenover, La Barge and Big Pine. The trip to Pinedale can be made in a day each way.

Green River

1—Leave Green River along the stream through the fertile, even valley, going through New York and Boulder to Pinedale, 110 miles. Three miles from Pinedale is Fremont lake. This section is studded with lakes and creeks, and large game is plentiful. For hunters of big game, such as elk, deer and bear, during the fall hunting season, the trip can be extended 30 miles through Cora to Kendall.

2—Another short tour branches off from the road at Eden Valley, passing through the historic South Pass, the overland gateway for the Lewis and Clark expedition and early pioneers, South Pass City and Atlantic City, early day gold camps, Lander and North Fork, to Fort Washakie. This is a 150-mile trip one way and can be covered in three days, including stop-overs.

3—For a half-day or a day go to Big Island, 25 miles from Green River, through a typical western cattle country. A large herd of wild elk is kept there in a timbered inclosure of many acres.

4—Another round trip of 120 miles easily made in one day is along the Green river south, crossing Black Fork to Buckboard, Linwood and Manila, the latter two in Utah, then to Burnt Fork and back to Green River. Glimpses of the Chimneys and Fire Hole are obtained, and the road leads to the very foot of the Uinta mountains.

Lander

A road to the southern entrance of the Yellowstone National Park from Lander, Wyo., is to be opened this summer. Directly out of Lander the road crosses the Shoshone Indian Reservation. Leaving the Wind River country it crosses the continental divide into the Jackson's Hole country and then passes directly into the southern entrance of the park.

Routes and Touring Information

Chalmers, Ind.—Yellowstone Park

CHALMERS, IND.—EDITOR MOTOR AGE—I am planning a trip to Yellowstone National Park. Kindly give the best route, also the distance from Chalmers, Ind., to Yellowstone Park.—W. C. Burns.

From Chalmers go north to Reynolds, then via Idaville, to Logansport, then via Royal Center, Thornhope, Winamac, North Judson, Mableton Sta., Valparaiso, Hobart, South Gary, Hammond, Ind., South Chicago, Ill., Chicago, Sterling, Galt, Hillsdale, Watertown, E. Moline, Moline, Ill., Davenport, Ia., Durant, Atlatana, Iowa City, Oxford, Marengo, Grinnell, Kellogg, Newton, Altonna, Des Moines, Adel, Redfield, Monteth, Avoca, Minden, Underwood, Weston, Council Bluffs, Ia., Omaha, Neb., Elkhorn, Waterloo, Fremont, North Bend, Schuyler, Richland, Columbus, Duncan, Central City, Grand Island, Shelton, Gibson, Kearney, Okeech,

Elm Creek, Lexington, Gothenburg, North Platte, Sutherland, Ogallala, Big Springs, Lodgepole, Sidney, Kimball, Bushnell, Neb., Pluehuff, Wyo., Egbert, Cheyenne, Beauford, The Siding, Laramie, Medicine Bowl, Hanna, Fort Steele, Rawlins, Wamsutter, Red Desert, Tipton, Salt Wells, Rock Springs, Green River, Bryan, Granger, Liman, Dog Springs, Evanston, Wyo., Wasatch, Utah, Henefer, Croydon, Morgan, Peterson, Ogden, Brigham, Wellsville, Logan, Utah, Franklin, Idaho, Whitney, Preston, Dayton, Oxford, Good Valley, McCammon, Inkom, Pocatello, Blackfoot, Idaho Falls, Rigby, Lorenzo, Rexburg, Sugar City, St. Anthony, Ashton, Yellowstone, Mont., then from Gardiner through Yellowstone Park via Hell's Half Acre, Tower Falls, Mammoth Hot Springs, Gardiner, Mont., then back over the Yellowstone Trail, if you so desire.

Vol. 4 and 5 of the Automobile Blue Book

The 1917 Automobile Blue Books and What Each Volume Covers

THE physiognomy of the new map showing the territory covered by the Automobile Blue Books for 1917, which appears on the opposite page, seems that of a stranger almost, for it has acquired new outlines and interlines that give it an altogether different aspect and show a maturity of road knowledge such as it has not even been the dreams of the previous few years of its existence that this year would attain.

States Are Redivided

You will notice the states have been redivided among the different volumes. When you look through the Blue Books you will notice the states in different divisions have been bound together by inter-volume routes that make one volume interlap the others to the next important terminals in all directions.

In the dim past of the motoring era, sixteen years ago, when a tour of 100 miles was something to talk about, the first Automobile Blue Book was published. It was a slim affair of some 200 pages and covered the entire United States. It was supposed to guide the motorist anywhere in the country. The directions were brief, and if a motorist contemplated a trip from New York, say to St. Paul, the directions would be to the point: "Go to Pittsburgh,

then Cleveland, then Toledo, then Chicago, then to St. Paul."

The one slim book of 1901 has grown to ten books; the 200 pages have grown to more than 10,000. The few maps have grown to more than 1000. The few thousand miles of motor roads described have grown to 400,000.

Because it would be a physical impossibility to incorporate all the touring information for the entire country into one usable book, the country has been distributed among ten books for the 1917 season. If in one book it is estimated that the information would make a volume 15 in. thick and 20 lb. heavy.

Volume 1—New York State and Adjacent Canada

This territory includes Long Island and adjacent states as far as New Haven, Danbury and Waterbury, Conn.; Pittsfield, Mass.; Rutland and Burlington, Vt.; Cleveland, Ohio; Pittsburgh, Wilkes-Barre, Scranton and Delaware Water Gap, Pa.; Trenton, Asbury Park and Atlantic City, N. J. The same territory is covered this year as last, but there is more detail of roads. A Blue Book car spent two months in New York State alone. The resort section is covered as never before, and many small routes have been developed. About

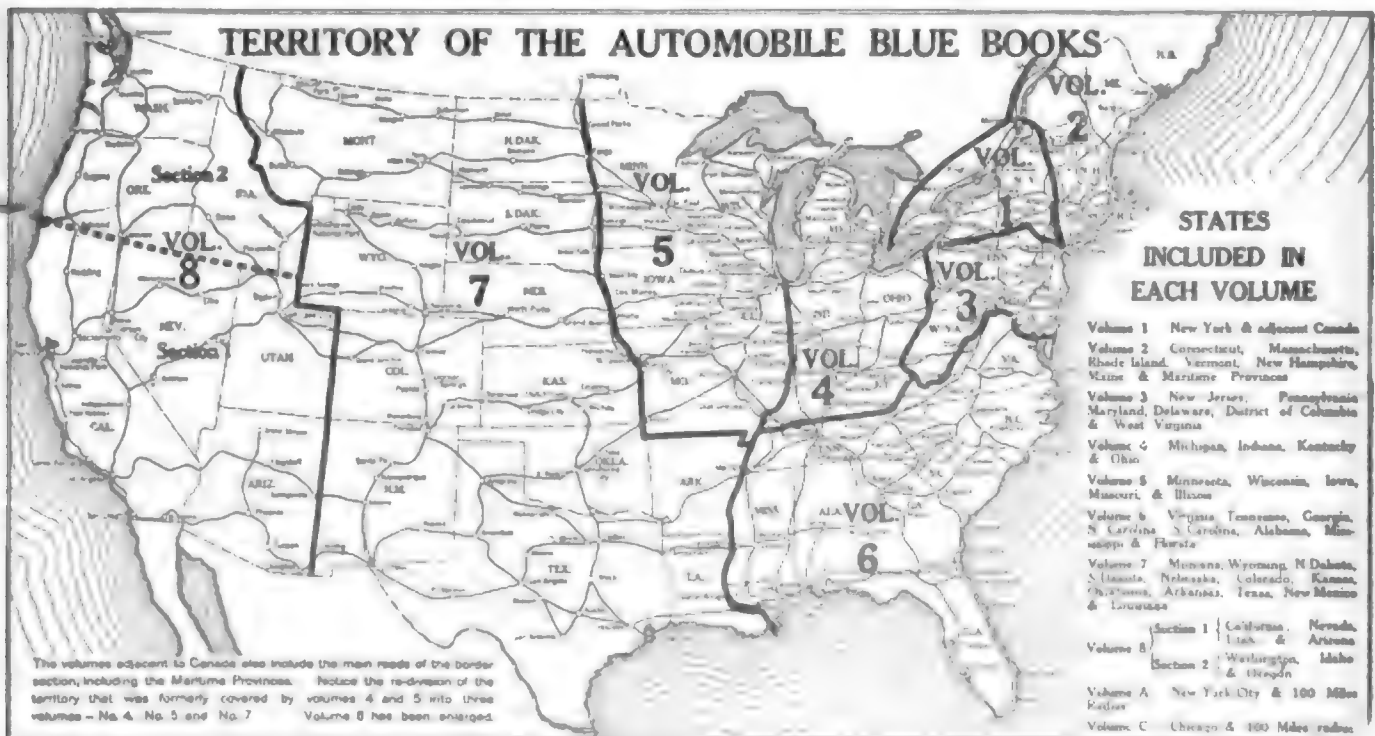
200 miles of new routes have been drafted in the New York section.

Volume 2—New England and Maritime Provinces

This includes Long Island, New York City and Eastern New York State as far as the eastern shore of the Hudson, Albany, Lake George and Lake Champlain section, Montreal and Quebec. A great improvement is noticeable in the outlining of a northern route from Quebec to Edmunston, Me., by Riviere du Loup. This makes possible for the first time a course across the Northern country, enabling the motorist to go through the White Mountain and North Atlantic Coast sections or vice versa without retracing his road. Added routes total about 300 miles.

Volume 3—New Jersey, Delaware, Maryland, the District of Columbia and West Virginia

All the main highways out of New York City with extensive routes into Southern New York State, Eastern Ohio to Canton and Cleveland and Northern Virginia are included in this book. The feature, no doubt, is the new route from New York to Philadelphia. This is 12 miles longer than the old road by Trenton but will save the motorist time inasmuch as it goes through a less crowded area. Edensburg, Pa., has



The territory covered by the 1917 Blue Books has been changed in several instances. Read of the improvements which these changes signify, and learn what difference they will make to you, a motorist

been made a new route center. The abolition of the motor car ferry from New York City to Atlantic Highlands, N. J., has led to changes in some of the routes in that section. A route now goes from Scranton, Pa., to Port Jervis, N. Y., by Carbondale, Pa. All trunk lines have been gone over carefully. The road from Washington to Richmond is reported to be in bad shape still. About 500 miles of new roads have been added.

Volume 4—Michigan, Indiana, Ohio and Kentucky

This volume covers a more restricted area than volume 4 of last year, and covers it more thoroughly. Wisconsin and Illinois have been moved to another volume. Extensive routes into adjacent states and trunk-line routes across Illinois to Chicago are given.

Volume 5—Illinois, Minnesota, Wisconsin, Iowa and Missouri

This includes a very small part of Volume 5 of last year, Minnesota, Iowa and Missouri being the only states from the vast area included in the 1916 volume. The Blue Book cars have spent much time in going over the old trunk lines and improving minor details as to roads, while the great road-building activity of the last year has added a good deal of mileage.

Volume 6—The Southeastern States

In these states are included Virginia, West Virginia, North and South Carolina, Georgia, Florida, Alabama, Mississippi, the extreme eastern part of Louisiana and Tennessee with extension routes into adjacent states, including Washington, D. C., and a single trunk-line route to New York City. Florida has been gone over mile for mile, and dozens of new routes have been added. Tallahassee has been made a route center with four lines leading from it. A route has been established from Tampa to Sarasota and from Fort Pierce to Lake Okechobee. About 1750 miles of new routes have been outlined.

Volume 7—Montana, Wyoming, Colorado, New Mexico, Texas, North and South Dakota, Nebraska, Kansas, Oklahoma, Arkansas and Louisiana

This section is made up of the greater part of the old Volume 5 and one state from old Volume 6. Extension routes lead to Spokane, Salt Lake City and Phoenix, and there are trunk-line routes eastward to the Mississippi river. A Blue Book car spent more than four months in Texas, Oklahoma, New Mexico and Louisiana this season, getting added road information. It is estimated that practically every line in Texas, for instance, was gone over. The car only left this section Feb. 15, when the weather made it impossible to keep on with the work. In fact, the car was left behind, as it could not travel farther on account of the weather.

Volume 8—The Pacific Coast States

No doubt this volume will be the greatest change for those who are familiar with the

Blue Books of last year. Two sections have been made of the volume, No. 1 including California, Nevada, Utah and Arizona and No. 2 including Washington, Oregon and Idaho. Last year, you will remember, the Pacific Coast volume included only California, Oregon and Washington. This new division has been made advisable by the added routes, which make it better to handle the information for this part of the country in two sections instead of one. The routes in this volume have been gone over also.

Volume A—New York City Metropolitan Blue Book

It includes 150 round trips within a radius of 100 miles of New York City. These trips are half-day, full day, week-end and three-day runs. That this section has been developed wonderfully during the one year of its existence as a Blue Book is evident when one considers that when first published, last year, it included trips with-

A ROAD OF SALT PROPOSED

Salt Lake City, Utah, March 30—Utah will have one of the most unusual motor car highways in the world—a road paved with salt and requiring neither construction nor upkeep—if the plan of E. R. Morgan, state road engineer, proves a feasible one. The scheme affects what is known as the Wendover cut-off, a 40-mile highway running west from Salt Lake to the Nevada line. It was commenced by Salt Lake business men, the state furnishing half the money, to appeal to transcontinental travelers.

Peculiar conditions exist along this road. The land is as flat as a billiard table. This flatness is due to its having been an old lake bed of the Great Salt lake. At one point along the road, known as the Salt Beds, where Teddy Tetzlaff unofficially broke the world's mile record in 1913, the salt is several feet deep and a veritable pavement. At that point no roadmaking is required. But for some 20 miles, the land is a mud flat.

In gouging out this mud flat with clam shovels to throw up a grade for a road, deep trenches were left alongside the road route. That was last summer. This year a trip of inspection shows that nature filled these holes with heavy salt water, that the water evaporated and left the earth cavities level—brimful of salt as hard as the salt beds themselves.

"All we will have to do is to lay 2 by 12 boards as far apart as we wish the road to be wide. These can be made almost water tight. Then the heavy salt water can be pumped into this road bed and renewed as rapidly as it evaporates or leaks out. Nature will do the rest. Within a year we will have a highway of salt as smooth and durable as the best of paving," Engineer Morgan says. This road, the Wendover Cutoff, is the one that enthusiasts urged be adopted as officially a part of the Lincoln highway around Salt Lake.

in a radius of 75 miles only of New York City, and not so many at that.

Volume C—Chicago Metropolitan Blue Book

This is an entirely new Blue Book and includes 150 round trips within a radius of 100 miles of Chicago. It will be similar to the New York City volume in that these trips will be half-day, full-day, week-end and three-day runs.

No doubt you wonder why Volume B has been skipped in the review of new Blue Books. This is because Volume B is as yet in the development stage only. It is to cover Metropolitan Boston, and the date of its publication has not been announced.

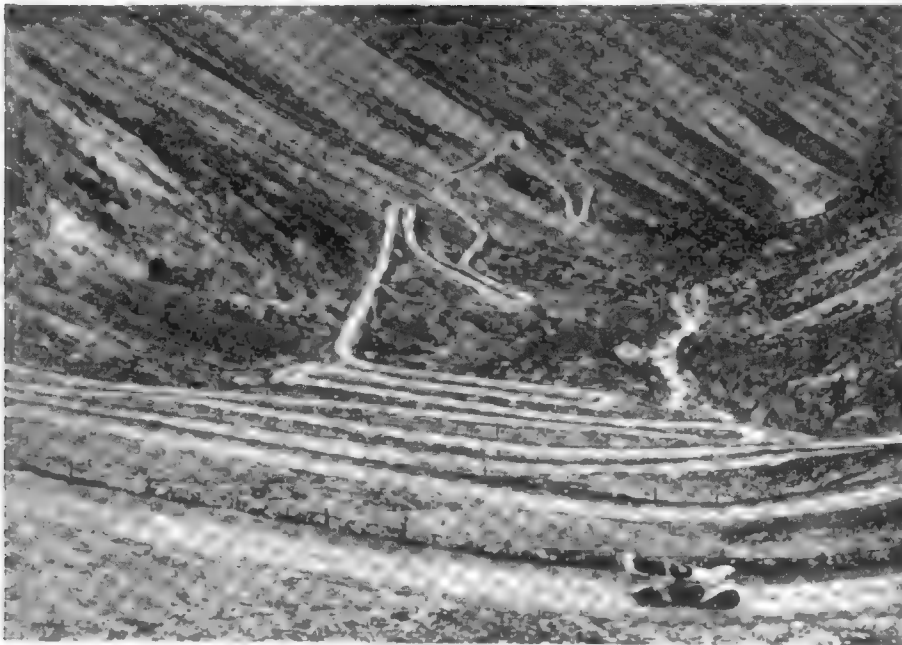
It will be observed this year that every volume overlaps the volume for adjoining territory. This is for the benefit of those motorists who, while they do not take the longer trips from New York to San Francisco, often take a trip of one or two weeks, covering a few states. These motorists can find in one volume all the information, description and so on they will ever want, while to make the transcontinental drive several volumes will be necessary.

A noteworthy improvement in the volumes this year is in the method of indexing. The index is run as a unit rather than scattered through the volume as heretofore. By turning to the first pages of the book you can find indicated every place in the book at which you will find some information concerning any one town or city. Each volume has this elaborate index, with every city, village and hamlet that can be reached by car in the territory; a large index map on which any point in the territory can be found, giving route numbers which refer to the detailed running directions and information for that route; a skeleton route map, showing the main routes, with numbers and mileages; and hundreds of other maps. Every route description shows the mileage not only between the main points but also between every point enroute, often down to $\frac{1}{4}$ mile.

Gathering the Information

This information has been gathered by thirteen Automobile Blue Book scout cars. These cars spend the better part of every year going over old routes, finding new ones, charting all roads, investigating conditions, hotels, garages, supply stations and so on. Roads change; new ones are built; old ones are discontinued. All this information is gathered by the scout cars and sent in to the editorial offices. This data is collected, classified and used to build up the volumes the year round. A staff of draftsmen is busy all year preparing new maps and correcting old ones. This year practically every map is new.

The first eight volumes of the new 1917 issue will be published April 24. Volume 6 is ready now. Volume A and C will be published a month later, May 24. The price of each volume is \$3, except Sections 1 and 2 of Volume 8, which are \$1.50 each. They are published by the Automobile Blue Book Pub. Co., Chicago.



The Stelvio pass between Italy and Austria, one of the finest roads in Europe. "It is the highest motor road in the world"

wheels could get through. Even the market square was littered with wreckage over its entire area so that only a caterpillar or four-wheel-drive tractor could cross it.

Smoothing the Wreckage

The first urgent necessity was to clear that road so that the motor car convoys could pass through with supplies for the troops ahead. Gangs of men followed up right behind the infantry and had orders first of all to make a single track passage through the wreckage. There were three traffic-congesting bottle-necks in that village, but there was no time to remove them; villages are built so solidly in Italy and Austria that even modern artillery cannot completely raze them to the ground. Farther ahead there were abandoned trenches right across the road. These had to be filled up with the plentiful wreckage to be found on all sides. There were huge shell holes; there were landslides formed by embankments having been shot away. All these had to be filled up roughly, hurriedly, with no thought of rolling, macadamizing, or even making the surface reasonably smooth. A track had to be made across that chaotic wreckage, and made immediately, so that the advancing troops could be adequately supported in case the enemy launched a counter-attack.

Day by day, and night by night, the road gangs worked until that rough single-track road was improved and enlarged until in time it became worthy of the name of road and, except when under heavy shell fire, could carry two steady streams of motor car and horse traffic. But the position was too important to be served by a single road. Before the war there had been a couple of picturesque, narrow mountain roads acting as auxiliaries to the main highway, but very little used except by the mountaineers. For 8 miles

these two winding mountain roads had been fought over inch by inch, every square yard of the country being pounded with shells until it was impossible for a stranger to say where groups of houses had once existed or to deduct from the meager wreckage whether a stable or a mansion had once existed on a particular site.

It was important that these two roads should be opened for traffic with the least possible delay to relieve the main road and make one-way trips possible for at least some of the convoys. The same system was adopted. First of all the bigger wreckage was cleared away so that sufficient width was provided for a single vehicle. As soon as this had been done traffic was allowed to come through, but as there were gradients of 10 to 12 per cent, conditions were the most strenuous possible. For a week only pack mules passed over the road, but as soon as the surface was strengthened and the necessary width obtained motor cars were sent forward and were able to tackle the rough conditions before it was possible to move with horse convoys. For a time traffic was slow, and sometimes the road gangs had to give a hand to get trucks over the most difficult stretches. But traffic never ceased, and the work of improving the road was never allowed to slacken.

From Cottage to Road

The question of material had to be solved. It was obviously impossible to bring up stone and other road material except by beginning at the Italian end of the road and working forward. Further, the trucks employed for this work would have been an encumbrance occupying space which could have been better filled by ammunition and food convoys. Instead, gangs of men were set to work to pull down the wrecked cottages and other buildings, and the materials thus obtained were used

for making the roads. Blocks of granite which had once formed the walls of some centuries-old castle went to form an embankment for a modern highway or would pave a gutter to carry away the heavy rains so frequent in this district. The smaller and more completely broken up material went under the hammer and was reduced to the regulation size of road chips.

This work was not carried on without danger. The enemy was sufficiently near to have these roads under observation, and any unusual activity would call forth artillery fire. One of the first tasks, therefore, was to put up screens roughly formed of rushes, along one or both sides of the road, and in some cases right across the road, at intervals of 30 or 40 yd., and sufficiently high for traffic to pass under. The peculiar nature of the country was such that the enemy sometimes had a road under observation from left and right, as well as right down the length of the road. In a few exceptional cases it was necessary to paint a huge canvas screen, something like scenic decorations of a theater, place it in position at night and let the men work behind it. Screened roads are found on all the European fronts but are particularly useful on the Italian front, where the mountainous conditions often bring the two forces close together in a straight line, yet far apart if the natural contour of the country has to be followed. Screens constitute a safeguard not to be measured by their material strength. With the road hidden from observation the enemy will not waste his shells on haphazard firing.

Sterilizing the Highways

It is quite common for the roadmen engaged in breaking stones to build a substantial sand-bagged dug-out or to make a small cave in the face of the cliff and carry on their work in the mouth of this shelter. If the whistle of a shell is heard they move back a few feet and are immediately in comparative safety. The men working on the open road usually have some abandoned cave into which they can dive if the enemy opens fire. They are also under instructions to seek shelter if an enemy airplane appears above, for not only is it undesirable that the enemy should know where work is being carried on, but falling shrapnel from the anti-aircraft batteries has to be guarded against.

These old battlefields are a hotbed of infection. For months men had lived in these human warrens; they had been buried there, and when the battle swept over the country corpses were left behind in the hundreds. Experience has shown that if these road workers are wounded by shell fire they are much more liable to septic poisoning than soldiers in the trenches, for their clothing is covered with germ-infested earth and an open wound allows those germs to be carried into the system.

Thus when ground has to be broken men are specially told off to sprinkle chloride of lime into the earth as it is loosened by

pairs have to be carried out while traffic is in progress. The only practical method is that of patching by hand labor, there being a roadman on an average of every 15 or 20 yards, whose task consists in dumping material and bedding it in whenever a slack period in the traffic makes it possible for him to work. These men take advantage of every interval and work with shovel and pile to the last fraction of a second, just jumping aside in time to allow the oncoming cars to pass. Where traffic conditions permit, the lighter types of gasoline water-ballast rollers are used, but their presence can only be tolerated

during periods of comparative military inactivity, when the traffic is thin. During the fine weather, and in the periods when traffic is light, arrangements have to be made to bring up supplies of road-making material and place it on refuge by the roadside. These refuges are made as shown in the accompanying sketch; it will be noticed that the deep ditch along each side of the road is carried around the refuge. In those portions of the country where roads are made with stones taken from the river beds, these refuges are very essential, for while the beds are dry in summer, they are under water during most

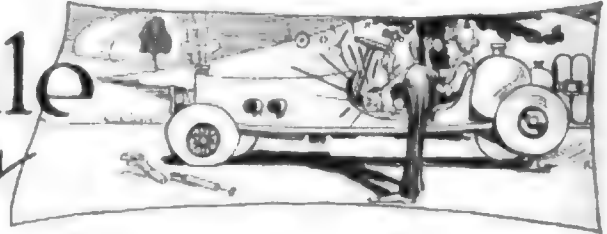
of the winter, and the supply of material is thus cut off.

There being no tarred roads on the Italian front and the extremes of climate tending to make roads very dusty in summer, elaborate arrangements have to be made for watering. In the level country at the head of the Adriatic little streams abound, and water nearly always can be kept running in the deep ditches along the roadside. A common method of watering in these cases is to use an all-metal wagon running on narrow track rails by the roadside and drawn by a donkey.

(Concluded next week)

The Automobile

By James Lovely



¶ The automobile is an ingenious contrivance of various kinds of metal, rubber, leather and a strong odor. It is used by mankind to kill time, and sometimes hens, chickens, pigs and larger game. Men who own automobiles are sometimes compelled to give up some of their time to business, as their pets are extremely voracious and cost a good deal to support. This, however, is often a blessing in disguise, because it gives them a greater rest for those pleasures the enjoyment of which constitutes real existence.

are a cross between reducing exercises and the conciliating bows necessary to make a good impression. When the machine has disgorged sufficiently, the attendant performs the same process upon the owner of the car, who usually becomes very red and disgorges with as much difficulty as the machine. The only difference between the two is that the car owner has his hose attached to the ground-work of his structure, not to the skyscraper. A well-fed automobile can make more noise, raise more dust and kill more hens than any other living thing unless it is a skunk attacked from behind.

¶ There are three sciences that automobile owners learn—perambulation, gyration and exasperation. Three branches of the last named are examination, prostration and perspiration.

¶ It is an interesting thing to watch a healthy automobile taking nourishment. The process is as follows: The creature is first of all directed towards what appears to be a mail box that has for some years been deprived of proper feeding. The upright arrangements are usually very red, and are bounded on the sky-piece by a length of hose. This trunk-like appendage is attached to the nostril of the auto, and the garage attendant coaxes it into disgorging. For this purpose he uses a series of motions with a pump handle which

¶ When an auto is kept long in captivity it will become very tame and can be made to serve many useful purposes. The horn, for example, can be kept in the house at night for a burglar alarm. The wheels can be taken off and will make attractive cushions.

¶ Some autos become very fond of their owners. It is said of one millionaire that when he died the only thing that wept was his automobile, which shed gasoline for days afterwards. It was found later that there was a screw loose somewhere, which accounted for it.

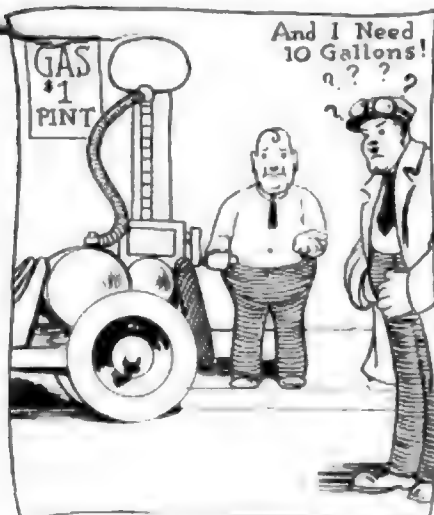
¶ The automobile is a useful creature and has its work in the great world.

¶ Some people prefer cats to automobiles as household pets. The two creatures are very much alike in many details. Both will purr when they are pleased and have two glaring eyes that shine in the night. They will also swear when you put your finger on the back of their necks, and even a dog will get out of the way. If it does not, there is usually something doing. Cats always land on their paws; an auto will often pause on the land, especially if you are in a hurry to catch a train. Autos cannot climb trees as cats can, although they will sometimes try. It is generally bad for the tree when they do.

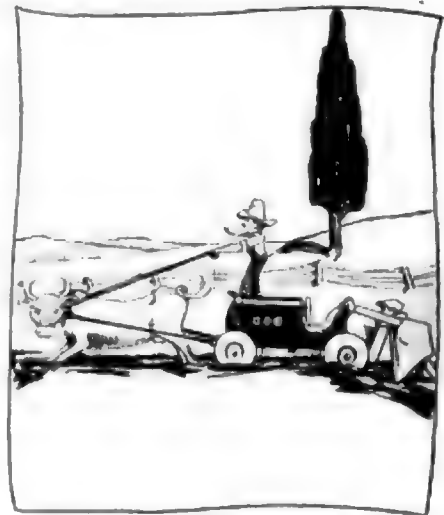
¶ Should an auto wish to retire from active life, this is the correct method of proceeding, as it usually falls on its back and the wheels are then easy to get at. If it falls far, the retiring may continue clear to the scrap heap.

¶ Any man who intends to adopt an automobile needs to possess three things—money, a garage and a large smile. He goes into his pocket when it needs food or repairs, he goes into the garage to smoke and whenever he feels like it, and into debt when his money is spent. The smile is useful when the creditors come with the bills.

¶ Autos often carry a spare tire on their backs. This is a sensible custom because it can be blown up and worn as a life belt in cases of emergency. It is just as well to be prepared, because you never know where you may get to.



Did you ever try to convert the loose change in your pocket into gas and see how little you get? Usually it's not enough to carry you back to your home



The 90-h.p. demon that the salesman told you would go anywhere sometimes needs other assistance. Some bovine power they forgot to give you when you bought

War Cars Bring Victory

Armored Motor Vehicles Get Credit for Capture of Cities in Europe

Raid on Enemy in Libyan Desert an Unusual Success

CHICAGO, April 2—Increased use and value of the armored motor car as a distinct unit of service with the allied armies is indicated in reports from all fronts of the European conflict. Several reports give the armored car credit for capturing cities in recent engagements. From the British headquarters in Egypt comes the report that in a raid of the Egyptian armored car column on a body of Mohammedans the cars traveled 200 miles into the Libyan desert, fought a stubborn and well entrenched enemy for twenty hours, and during the night, twenty-two men in the cars remained within 500 yards of a foe outnumbering them 25 to 1. According to an Associated Press dispatch, told by an eye witness, the cars had a hot reception.

"The tops of the turrets had been removed to save weight, and the mohafzia, as the Senussi sharpshooters are called, scampered from their places of security behind rocks to the top of limestone cliffs and poured down a plunging fire in the hope of hitting the machine gunners inside the car. Leaving one car in the center to engage the enemy, the remainder moved to the right and left to enfilade the position, and for half an hour the one car at the center received the fire from two ten-pounder mountain guns, two machine guns, and 800 rifles.

Dispatches Cite Cars' Exploits

"Further in the rear the patrols in unarmored cars with machine guns came into action, and so sprinkled the hill with bullets that the enemy dared no longer show a head. At noon a Senussi bugler sounded the charge and many of the enemy rose to advance, but the motor machine gunners did such execution that they quickly dropped back to cover. All through the night the armored cars were stationary. Such a wholesome dread had the Senussi of the armored cars that 800 of them made no attempt to rush the little band."

Dispatches from the Western front recount the exploits of armored cars in clearing out the German's rear guard from towns and entrenched positions during the recent German retreat.

FRANCE PROHIBITS CAR IMPORT

Paris, France, March 24—France, one of our largest motor and truck buyers, has prohibited the importation of goods of foreign origin either to that country or to Algeria. The decree was published March 22. The prohibition is not applicable to

imports or Government account, goods proved to have been shipped direct to France or Algeria before the publication of the decree, or goods declared for warehousing before its publication.

The gasoline situation in Europe is becoming more acute each day. To date, India, Holland and France have prohibited motor vehicle importation. Denmark's gasoline situation was so acute that it stopped the driving of passenger cars through its streets.

France was one of our biggest buyers in February, when she bought 503 cars valued at more than \$1,000,000. For the seven months ending February, her purchases amounted to 4,328 cars and trucks valued at \$12,925,101.

\$250,000 FOR MOTOR AMBULANCE

New York, March 3—Robert W. Goellet has donated \$250,000 for the establishment and equipment of two additional ambulance sections of the Harjes-Norton American Ambulance Corps operating with the French army and consisting at present of three sections with about seventy-five cars and 120 men. The two new sections will consist exclusively of Americans. Each car will have two drivers and will operate from field dressing stations to base hospitals. These men serve at least six months. Recruits will be made for the new sections, each of which will have between twenty and twenty-five cars and forty or fifty men.

NEED OF ROADS AGITATED

Washington, D. C., March 31—All over the country the need of roads in connection with comprehensive preparedness is being expressed in new legislation and in good roads rallies. Birmingham, Ala., is to have a roads gathering April 17.

"If we are to have war, we must have roads; if we have peace, we must also have roads. It may be that I can be of service to my country, whether in war or in peace, by promoting in every way possible the building of better highways," says Chairman John H. Bankhead of the Senate committee on postoffices and postroads.

The first public speech of Governor William B. Stephens in California calls for "Federal, state and county co-operation in the construction of military roads for coast protection and for defense in other ways."

Under the direction of Chairman George C. Diehl of the A. A. A. Good Roads Board a special edition of the A. A. A. transcontinental map has been prepared to show the main usable interstate and intrastate roads which would fit into a countrywide system that would lend itself for military purposes. These maps are to be sent to President Wilson, Major General Hugh L. Scott, Brigadier-General Joseph E. Kuhn and Director W. S. Gifford of the Council of National Defense.

War May Mean No Races

Speedway Managers Rest Final Decision on Action of Session of Congress

Decoration Day Date Dispute Gives Way to Crisis

CHICAGO, April 2—Whether or not there will be motor car races at any of the major speedways on May 30 or possibly at any time during the year probably will depend upon the action taken by Congress at a special war session which opens to-day. Announcement was made Saturday in Cincinnati, after a conference between David F. Reid, president of the Chicago Speedway, and Harry Lehman, president of the Cincinnati speedway. Both tracks have applied to the American Automobile Association Contest Board, for the Memorial Day date following its surrender by the management of the Indianapolis track.

"We decided to await the action of congress before settling our dispute over the May 30 date," President Reid said. "There is a possibility that the government in the national crisis may need the services of all the race drivers and mechanics either in aviation schools or for assisting in mobilization, and may wish to use the speedways for military training camps. Under such conditions, motor car races will be out of the question and it is our wish to co-operate with the government and do all in our power to assist in America's defense. We will wait until this greatest of national questions is answered before attempting to settle a personal dispute over a race date."

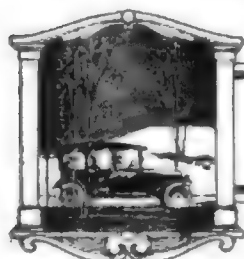
WILLYS SIX \$1,425

Toledo, O., March 31—The Willys-Overland Co. announces that the Willys six will sell at \$1,425 after April 1. This advance is in addition to the price increases announced in last week's issue of MOTOR AGE. It is further announced that the prices of the Overland big four and the light six touring cars will be advanced May 1.

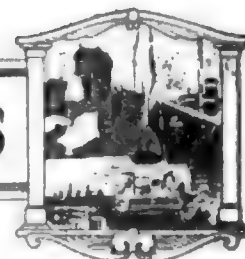
PARACHUTES FOR AIRPLANES

Los Angeles, March 25—A new type of airplane equipped with a platform to carry a lightweight motorcycle so that stranded aviators can avoid such perils as were experienced by Colonel Bishop and Lieutenant Robertson of the United States Army corps in the Sonora desert several weeks ago, has been designed, constructed and successfully demonstrated by the Glenn Martin Co., Los Angeles, Cal.

The airplane is a Martin tractor biplane with a platform between the two planes and alongside the fuselage. On this platform is strapped a motorcycle weighing 150 lb.



EDITORIAL PERSPECTIVES



Our Supplement Map

MOTOR AGE is proud of the annual touring supplement which goes with this issue in the form of a national touring map in colors, which not only shows the major highways but scores of feeder roads as well. It is human to feel proud of personal achievements and as this week's supplement is quite superior to its two predecessors, MOTOR AGE proudly draws the attention of its readers to this map.

THIS supplement map, like the eighteen sectional maps, was drawn by over 800 MOTOR AGE readers. It is a composite map. It is a new map—not a copied one. True, some of the great highways are shown on this map the same as they were a year ago, but the minor highways and the feeders are new.

MOTOR AGE sent out over 7500 personal letters to get the information on this supplement map and also that on the

other sixteen pages of maps, also in color, in this issue. On these page maps are routes not heretofore shown on any map embracing so large an area. These routes have been contributed by motorists living in the territory served by the routes. They are routes that these motorists have traveled over. They are tourable routes and not imaginary ones.

THE motor car is not to-day a vehicle of the cities or towns, but its use is as general as the distribution of mail; its ramifications as broad as those of the rural telephone, and its use takes in every road, improved or otherwise, in the country. These state or territorial maps cover every corner of the land. They are useful for the small village car owner in any of the forty-eight states. These maps bring a new service to motorists and put on the touring map routes that heretofore have not been noticed.

Need of Permanent Roads

THERE is no better time than to-day to push the movement for permanent highways through the Mississippi Valley, one of the two great granaries of North America. The day has passed when dragged dirt roads will suffice. They have been a good stepping stone, but these stepping stones must not be interpreted as final. They are only steps in the staircase leading to finality.

NEW England, New York State, New Jersey, Maryland and a few other sections of the North Atlantic seaboard to which we can add sections in Ohio, Pennsylvania, Indiana and California are the only parts of the country that can boast proudly of a usable system of roads, good for service twelve months in the year, whether it rains or snows. In such places the motor truck—either in war or peace—can carry on the work it is destined to do. A few other local areas might be added.

PERMANENT roads for motor trucks and motor cars all through the great Mississippi Valley, that territory must come entirely under the sway of the farm tractor, the gasoline tractor that will cultivate the soil and become the final step in motorizing the farm. The economical development of this territory demands that tractors replace horses.

SCIENCE has proved that farm land cultivated in the hot month of July retains more fertility than the same land plowed in August or September. The yield of winter wheat is less per acre when the soil is not plowed deep in July. With horses this plowing cannot be done in July. With farm tractors it can be done in July and can be deeper than with horses. This

scientifically established fact makes it just as imperative that the Mississippi Valley get tractorized and that it get its permanent roads. It requires both. Both are essential to the individual farmer. Both are essential to the economical development of the entire nation.

NAPOLÉON Bonaparte, 100 years ago, saw the great necessity for stone roads—not dirt roads but broad, well-built stone roads. As soon as he conquered a country he started his road-building armies at work. Witness that he carried his road-building program into the dependencies of conquered countries and when Holland temporarily came under his control he started the building of stone roads in such far-away possessions as the Island of Java, where good stone roads still exist as monuments to the civilizing conception he had of roads.

THE potential investment of roads to this country has not been realized. We require them for defense purposes but we need them also for development purposes. To-day our farmers do not appreciate the financial returns that come from permanent roads that are usable 12 months in the year. The motor car has worked marvels in building roads usable in dry and medium-wet seasons but the country has not yet awakened to the financial value of the road that is usable 12 months in the year.

WHETHER war comes or not, this job stares us in the face and it is conservative criticism when we state that such a highly developed agricultural valley without stone roads is a national disgrace, not to characterize it as a national weakness and a standing invitation to foreign aggression.

Touring Tire Service

WHAT destroys the pleasure of a tour so much as to be short of inner tubes with several days' trip ahead? You arrive at the hotel late in the evening with your good nature slightly ruffled due to two or three quite unexpected punctures, and what good nature you have in reserve is nearly exhausted when

you discover there is not a place to get your tubes vulcanized. The garageman advises that the only person on the job is the night man, and that while he cannot vulcanize the tubes he has some quick-repair patches that may do. If your tires are 34 by 4 or larger and the weather is hot, you know the failures of

Industry Is Ready to Give War Aid Makers Plan to Turn Over Plants or Operate for Government

DETROIT, Mich., April 3—Special telegram—The war crisis now facing the nation finds the motor car industry ready to put forth most effective efforts for the defense of the country. Many car and parts makers already have engaged in the manufacture of munitions, airplane motors, trucks and other war needs and every plant has stated its readiness either to turn its factory over or to operate it for government requirements.

While of necessity there must be a certain secrecy maintained about various activities, and companies refuse to divulge operations or plans, it may be said that the machinery of every plant has been listed and indexed so that the Government knows just what demands it can safely make. One of the large parts companies is engaged now in the manufacture of shells and at least three of the motor car factories are making munitions in a small way to keep the men informed and machinery in readiness.

One Perfects Airplane Engine

One large manufacturer has practically perfected an airplane engine, which as soon as experiments are completed, will be made in great quantities and a number of other plants are engaged in similar work. The stranger at different factories finds himself carefully watched and must have passes from important officials of the concerns before he is allowed to venture beyond the front door.

Several of the factories maintain armed guards about their buildings and a number, while admitting activities along these lines, refuse to divulge the scope of their operations.

Akron, Ohio, where large rubber plants are located, is completely under Federal guard and the Goodrich plant has been inventoried by the Government, which has enlisted 1,000 Goodrich employees for manufacturing purposes. Goodyear tire and rubber factories are engaged in making dirigibles for army purposes.

Racers Organize

The Society of Automotive Engineers is making active preparations to meet the need for trained men. Racing drivers already have organized for the aviation section of army and twenty-six have signed, while ten remain to be heard from. Among those signed are Joseph Boyer, Jr., Ralph de Palma, Eddie Rickenbacher, Billy Chandler, Ira Vail and Louis Fontaine. Ralph Mulford, now en route from Florida, is expected to sign. Louis Chevrolet is organizing an engineering department of which he will be a member.

It is likely that Howard Coffin, vice-president of the Hudson Motor Car Co., and commissioner in charge of munitions prep-

arations will be appointed Secretary of Munitions in the President's cabinet.

The various divisions of the General Motors Co. are momentarily awaiting word from W. O. Durant, president, who is hastening east from the Pacific coast, and will send such men into Government service as the country will require, besides turning over all their machinery and factories as may assist in military operations.

The Maxwell Motor Car Co. has 1000 trucks in process of manufacture that can be turned over to the Government and stands ready either to turn over the plant or to divert operations as the demands may be. The Willys-Overland Co. and the Ford Motor Co., have already expressed willingness to turn over their plants to the Government, or to operate as the nation demands.

The Cadillac Motor Car Co., has filed a report with the Government setting forth various means in which it could be of advantage. The factory is prepared to turn out special motor cars for the transportation of troops, or to turn to the manufacture of army trucks, or to manufacture airplane engines and stands ready to convert its motor car body plant into a factory for making airplane bodies.

Makers Are Ready

The Reo Motor Car Co., while not yet engaged in active Government work, stands in readiness to do anything asked of it and will divert its truck and pleasure car plants to Government work on momentary notice. At present the company, as is the case with many others, finds it difficult to manufacture trucks and cars in quantities to meet the ordinary demand and in consequence has none on hand that would be immediately available for Government service.

The Buick Motor Co. and the Chevrolet Motor Co. stand ready to do whatever the Government requests.

GRAY LEAVES HAYNES

Kokomo, Ind., April 2—R. T. Gray, advertising manager of the Haynes Automobile Co., has resigned and joined the staff of the Shuman Advertising Co., Chicago.

INTERCITY RULES OUT

New York, March 30—The city that wins the three-day Intercity Team Reliability Contest from Buffalo and return July 17 to 19, will have license to brag of its cars and drivers if present plans are carried out as outlined in the entry blanks which appear this week. The contest is to be between teams of picked non-professional drivers from eight or ten of the larger cities, the teams being limited to a minimum of five and a maximum of ten cars.

Sanction has been granted by the American Automobile Association as a class E non-stock invitation contest and the team with the lowest penalization will be awarded the A. A. A. touring trophy. Penalizations are to be assessed for lateness at the three daily controls at the rate of one point per minute. Cars not starting within 5 minutes of their starting time are assessed 5 points and have to make up the time. Motor stops cost 5 points per minute and work costs a point per man per minute. Two points per minute are assessed for taking on supplies outside of controls. Arrests for violation of speed laws mean disqualification.

DUFFIELD HEADS BAILEY SALES

Chicago, April 3—J. E. Duffield, formerly in charge of tire sales for the Brunswick-Balke-Collender Co., has become treasurer and general manager of the Bailey Non-Stall Differential Co., succeeding W. H. Needham. Duffield is succeeded in the Brunswick sales by John W. McGuire, as reported in MOTOR AGE March 29.

KAISER'S CAR AUCTIONED

New York, April 2—According to an Associated Press dispatch from London, a motor car which was built in Germany for the personal use of Emperor William and which had been sent to London just before the war to be fitted with an English body has just been sold for \$35,000 to a Danish ship owner. The car has been in the hands of the body builders ever since it was finished and was ordered sold by the courts to satisfy their charges. It is called by English experts the most luxurious motor car ever built, and the price paid for it at auction is believed to be a record for a car for personal use.

CONCRETE FOR LINCOLN HIGHWAY

Salt Lake, March 30—Local bankers have announced that they have on deposit here part of the preliminary funds to be used by the Lincoln Highway Association for building a 22-mile concrete road across Great Salt Lake desert. The present route of the highway is south of the desert through a mud flat known as Fish Springs. The proposed highway would eliminate this by paving right across what is called "the worst place on the entire road," that is, from Granite Mountain to Redding Springs. Estimates made by the American Association of Concrete Manufacturers place the road cost in the neighborhood of \$300,000.

GEORGIA PLANS ROAD DAY

Savannah, Ga., March 31—Motorists in Georgia are co-operating in a movement to make Good Roads Day, March 30, at the Chautauqua of the South a great success. On this day a movement will be launched for the construction of permanent concrete highways in Georgia. At the gathering a movement will be launched for the construction of concrete roads in the state, the funds to be raised by joint bond issues in

readily see that if the government asks us to supply 1000 trained men and this 1000 must be chosen from 3000 men, it would mean a vastly different problem than if it were chosen from 5000. Each and every one of you can to-day best serve his country by getting one now eligible member in the S.A.E., and those of you who are not members can do your country no greater service than by joining now.

"Second, your council is card-indexing the membership of the entire society to locate each man where he will be best fitted in case of need.

"Third, a general committee has been appointed by your council to handle the affairs of the society in each of the various localities where the activities of the society extends, and it will be the duty of these general committeemen to supervise the society's activities in its relation to war in that section. Each of these men has pledged his undivided and untiring efforts. In this section I have the honor of being the committeeman.

"Fourth, a committee of three of the council has been appointed to be known as a steering committee, which has entire and absolute charge of the activity of the society at Washington, and it has pledged its time night and day to be there to further the work and interests of the country and society.

"Fifth, the council of the society has pledged itself to the general supervision of this work and to attend all meetings, to work individually and collectively for the welfare of your country and of the society.

To Serve Through Society

"There's the story. We need you and your help. We feel you can best serve your country through the offices of the society. Take, for instance, the case of a foreman of any assembly department. Suppose in one case he enlists as a private. His family, if dependent on him, will suffer and his services are of no greater value those of the lowest type of labor. Suppose, on the other hand, through the S.A.E. his services are offered and taken only when needed. He receives an appointment as a sergeant at much higher pay and is put in charge of a motor repair shop or aero repair shop. Hasn't he served his country much, much better? We want you."

The meeting was terminated by a paper on "The Overhead-Valve Problem of an Aluminum Motor," delivered by A. L. Nelson, chief experimental engineer of the Premier Motor Corp., in which he gave to the engineers the methods whereby Premier designed its cam action to insure quietness, at the same time taking in the factor of great expansion of aluminum cylinders, and this designing being done by analytical analysis rather than by experimentation. It is doubtful whether cams have been designed in this manner before, and Nelson stated that, by simple alteration of the sizes of parts the formulas can be used for any type of valve lift.

G. P. System Stands Test

Patent Device Shows Fuel Economy of 25.5 m. p. g. of Kerosene

Gasoline Is Used for Starting Only with Device

CHICAGO, March 30—Statements of kerosene enthusiasts that economy of operation on kerosene as compared with gasoline comes not only from the difference in the price of the fuel itself, but also in a greater mileage per gallon on kerosene if carburetion and compression are properly cared for seems to be borne out by a recent A. A. A. test of the G. P. system for using kerosene in which a distance of 25.5 miles was run on a gallon of kerosene as against 23.0 miles on a gallon of gasoline with a Ford car and stock carburetor.

A. A. A. Sanction

This test was under sanction of the American Automobile Association and under the supervision of E. A. Hillman, representative of the A. A. A. Contest Board for this territory. With the same setting of the carburetor at which the economy test was made, an acceleration from 10 to 25 miles per hour was made in 15.6 seconds. With that adjustment the car idled nicely down to 10 miles per hour, but with a richer adjustment its running was good at 4 miles per hour. The car has been in service since last fall, during which period the carbon had been removed twice, according to the owner. It had been operating on kerosene since it came from the factory. During the test the top was down and the windshield up, and with the three passengers, weighed 2,156 lbs.

The G. P. system made by the G. P. Coal Oil System Co., 1806 Michigan Ave., Chicago, consists of a patented means of heating the intake gas by passing it through a specially designed manifold heated by the exhaust gas. In starting a cold motor, gas-

oline is used, the change to kerosene being made by a valve on the dash as soon as the engine warms up. During the test in question a completely cold motor was started on gasoline and was operating on kerosene in 1 min. 25 sec.

During the entire test there was no evidence of smoke and except for the necessity of starting on gasoline and the inability to throttle down with the most economical setting to less than 10 miles per hour no distinction could be seen between the operation on kerosene and that on gasoline. If anything, the operation seemed a little smoother with the heavier fuel. In utilizing this system the manufacturer finds it necessary for best results to lower the compression by putting in a 1/8-in. gasket between cylinder and cylinder head. This gasket was in place during the gasoline economy test as well and whether a better mileage on gasoline would have been obtained with a normal combustion space remains to be determined.

This system is manufactured in three sizes, and is applicable to practically any car. Its installation on a Ford is illustrated herewith. The Ford equipment sells for \$25.

In order to provide more positive cooling water circulation on the Ford, this company also fits a special water circulator which operates from the fan pulley.

The gasoline used in the test was Red Crown of regular grade, costing 21 cents per gallon. The kerosene cost 8 cents per gallon. On the basis of this test the kerosene cost per mile was .003 cents as against .008 cents when operated on gasoline.

RACING AT TWIN-CITIES

New York, March 30—The revival of speedway racing at the Twin-Cities track is being planned. A complete reorganization will occur soon, and a race meet will be held some time this spring. Stanley Kandul of Chicago, who has been identified with the racing field, is working on the reorganization.

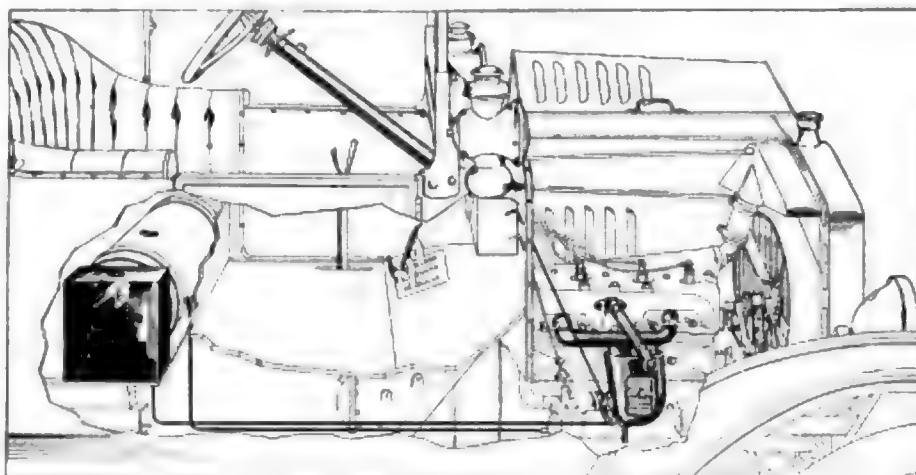


Diagram showing method of installing the G. P. system on a Ford



The Motor Car Repair Shop



Shall I Grind My Valves?

A NUMBER of readers who have instituted a spring cleanup on their cars have asked us how to determine whether the valves need grinding or not.

If you have the time and the inclination we would suggest that you grind them whether they need it or not, if they have not been ground for a thousand or so miles of driving. By whether they need it or not, we mean whether or not you test the compression. It is like the man who takes a seasonal bath whether he needs it or not. It is quite reasonable to assume that he needs it.

To test the compression of an engine, one has but to crank slowly by hand for several revolutions of the crankshaft, and at the same time carefully feel the com-

pression resistance. If the compression is comparatively strong and of an elastic or reactive character, it is good. This is a fair indication that the valves are seating properly, although a small leak would not have enough effect to be felt by hand. It also should be noted that the compression or resistance to the cranking effort for each cylinder is practically the same.

When a loss of compression, accompanied by a consequent loss of power, makes it necessary to grind the valves of an engine, the sooner the job is performed the better. It will save the seats of the valves, save gasoline, and save the aggravation of a faulty operating engine.

A compression meter is a valuable equipment in a garage. These can be made from

tire pressure gages although they are not as accurate as one which is more accurately calibrated. With the ordinary barrel type of tire gage, one can insert it into the shell of a spark plug and pour solder around it to make it gas tight. Then by screwing the shell and gage into the spark plug hole and turning the engine over by hand one can get a fairly accurate register of the compression. At least this will tell whether each cylinder has the same amount of compression. Do not use this makeshift, soldered gage with the engine firing. It would not take long for the solder to melt and work down into the cylinder with harmful results. The factory will supply you with the proper compression figures for your particular engine.

Oil or Grease?

There are many motorists having difficulty in keeping their cars or garages clean owing to the fact that oil and grease seem to leak continually from the gearbox and rear axle housings. Where oil should be used the unwise motorist often puts in hard grease, which in a comparatively short time may be worked up into the recesses of the case where it will do no good at all.

There are many gearsets, of course, which are designed so that hard grease can be used more advantageously than flowing oil. But, if the manufacturer recommends a flowing oil it should be used without question. The greater amount of oil-leaking

trouble experienced by motorists is due to the use of too much oil in the gearbox and rear axle housing. In a gearbox in which a fluid oil is used, the amount of lubricant maintained therein should be no higher than the center of the lowermost gearshaft. This pertains to gearsets in which the shafts are either in a horizontal or a vertical plane. In a gearbox having the gearshafts in the same horizontal plane the oil should reach the center of both gearshafts; and though only the lower shaft of a gearset having the shafts in the same vertical plane will be partly submerged in the lubricant, this shaft and its gears when in motion will throw plenty of oil onto the

other working mechanisms of the case. If too much oil is used it only tends to work out through the bearings, causing a waste of oil, and a dirty car or garage floor.

The same applies to the lubrication of the rear axle, the only difference being that the oil which escapes not only tends to render the brakes ineffective, but often the oil is thrown out onto the wheels, tires and car body, giving them all a dirty appearance, damaging the latter two, and making considerable work for the car washer. Should a reduction of the amount of oil used prove ineffective, have new felt washers fitted to the axle ends. This should cure the trouble by all means.

Heating Old Manifolds

Richmond, Va.—Editor MOTOR AGE—Manufacturers should be encouraged to adopt a standard model, and stick to it from year to year with as little variation as possible instead of as much as possible as is the case now. With the exception of such parts as carbureters, etc., every piece on a 1914 model should interchange on a 1917, or 5 years later. In many cases these changes are not real improvements, but selling talk, as many manufacturers go back several years afterward to some old ideas which have proved best through years of service.

Poor Gasoline—Old cars having long intake manifolds will be far more efficient if a pipe were tapped into the exhaust manifold and run parallel with the intake. Make a coat of asbestos to wrap the intake pipe and hot pipe from the exhaust together. In most instances a ½-inch pipe will supply enough heat. The cost is very slight, as the average cost of material for such a job is less than \$2. This pipe can be carried down through the dust pan, or into the exhaust pipe. The noise is very slight when it is allowed to run free into the air below the dust pan.

Warming the intake in this way is quickly done, as it gets hot long before the water in the radiator and never gets too hot, as there should be ¼-inch space between the two pipes, especially where there is a soldered joint in the intake manifold. Many of the old cars have long, copper intake manifolds with soldered joints, consequently ¼-inch space between the two pipes is sufficiently safe.

I am sure any one putting on this attachment will save gasoline and have a better running engine in addition.—B. Dorsey Sydnor.

Greasing Spring Leaves

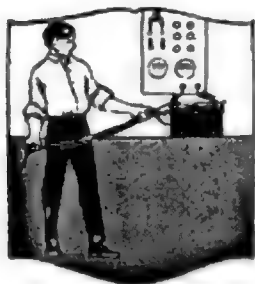
St. Joseph, Mich.—Editor MOTOR AGE—I noticed the appeal for time-saving schemes and herewith give one which I have found very satisfactory.

Many drivers do not use grease or graphite grease between the spring leaves often enough. It is rather a tedious and dirty job when done in the ordinary way.

When the following process is used it is not necessary to get under the car or jack up the body. Secure a piece of round ¼-in. bar of cold rolled steel 2½ ft. long. Taper one end similar to a cold chisel, using a long taper of 3 in., draw the edge out thin but do not sharpen to a cutting edge. The length of this tool enables one

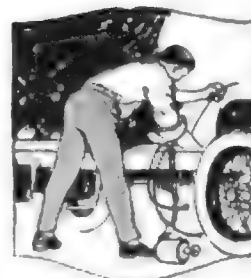
to use it between the spokes of the wheels, and a sharp blow with a hammer separates the leaves better than any patented appliance I have seen.

Numerous other uses may be found around a garage for such a tool. It makes an excellent tire iron or small pry bar.—C. H. Williamson.



Electrical Equipment of the Motor Car

By David Penn-Moreton & Darwin & Hatch.



Editor's Note—Herewith is reprinted in answer to a number of requests a special installment of a weekly series of articles which began in Motor Age issue of June 29, designed to give the motorist the knowledge necessary to enable him to care for and repair any and all of the electrical features of his car, no matter what make or model it may be. "Electrical Equipment of Motor Car," with additions, will be published in book form by the Class Journal Co., in a size to fit the pocket conveniently.

Locating Common Starting and Lighting Troubles

NOTE—This is a special installment of the series published at this time in answer to a number of requests from readers. When this material is published in book form, it will appear in different form in another portion of the work.

AT LEAST 90 per cent of the difficulties encountered in the operation of modern starting and lighting systems are due to one or more of the following causes:

- (a) Battery partly or entirely discharged.
- (b) Open circuits due to broken connections, etc.
- (c) Bad contacts.
- (d) Short-circuits.
- (e) Grounded circuits.
- (f) Improper equipment.

For convenience, the various cases of trouble may be classified as belonging to one or the other of two groups and these may be called lighting troubles and starting troubles.

Lighting Troubles

No Lights, Engine Not Running

This condition is usually due to a discharged battery or an open circuit. The battery may be tested by operating the starting motor, but if the motor fails to operate do not assume that the battery must be discharged as there may be an open in the starting circuit as well as in the lighting circuit. Open the battery compartment and examine the connections to the battery to make sure they are all clean and tight. If no loose connections are found at the battery test it by means of a test lamp or voltmeter, if either is available, or by a hydrometer.

In the absence of a test lamp and voltmeter the approximate condition of charge of the battery may be tested by momentarily short-circuiting it with a short piece of wire or other conductor. If it is completely discharged, practically no spark or arc will form when the short circuit is broken. This method of testing is advised only in an emergency. Should the battery be found discharged it may be due to any one or a combination of the following causes and the trouble should be located and corrected.

- (a) Short circuits in the wiring, lamps, switches, and other equipment.
- (b) Battery worn out, internal short circuit, low electrolyte, excessive lamp load, improper use of starting motor, partial short-circuit caused by acid and moisture on top of battery, etc.
- (c) Cut-out not operating properly and as a result the battery discharges through the generator.

If the condition of the battery is found to be correct, then the trouble is doubtless due to an open circuit. An inspection of the circuit may locate the trouble which may be due to a terminal coming loose, a terminal block or switch open, blown fuse, loose wires in lamp sockets, burned out lamps, broken wire, lamps loose in sockets, defective switch, and so forth. If the open circuit is not readily located by an inspection of the cir-

cuit it may be found by testing, as explained in one of the following sections.

No Lights, Engine Running

If no lights burn when the engine is running, the cause of the trouble may be any one or a combination of the following:

- (a) Circuits connected to the battery short-circuited, which also short-circuits the generator.
- (b) Open circuit between battery and lights as explained above, or an open circuit between the generator and battery.
- (c) No voltage generated by the generator, which may be due to dirty or roughened commutator, brushes stuck in holders and not in contact with the commutator, brushes not fitted to surface of commutator, no pressure on brushes so as to hold them on the commutator, winding burned out or grounded, short-circuited or grounded field coils, etc.
- (d) The cut-out and regulator may not be operating due to improper adjustment, burnt-out winding, broken connections, dirty contacts, worn-out contacts, etc.

One or More Lights Out, Others Bright

If one or more of the lamps do not light when turned on, but others do light the trouble is due probably to:

- (a) Fuse blown.
- (b) Bulb burned out.
- (c) Bulb loose in socket.
- (d) Open or ground in wire to lamp from switch.
- (e) Switch does not close.

First try the bulb by making sure it is firm in its socket and then inserting it in a socket to replace a lamp that is burning. If it does not light, the bulb must be renewed; if it does light the trouble is between the switch and the socket. Then look to the fuse. If it is correct, the trouble is between fuse block and socket and can be located by inspection for grounds or open circuits or tested as explained later.

Dim and Flickering Lights

If all the lights are dim when the engine is not running, the cause is a partly discharged battery.

If all the lights are dim when the engine is running, the cause is a partly discharged battery, or the cut-out, regulator or generator are not operating correctly.

When one or more, but not all, lamps flicker, the cause of the trouble may be due to loose connection in the lamp circuit, broken filament or the cut-out may not be operating properly.

When some lights are dim and others of supposedly the same candlepower are bright the cause of the trouble may be a poor

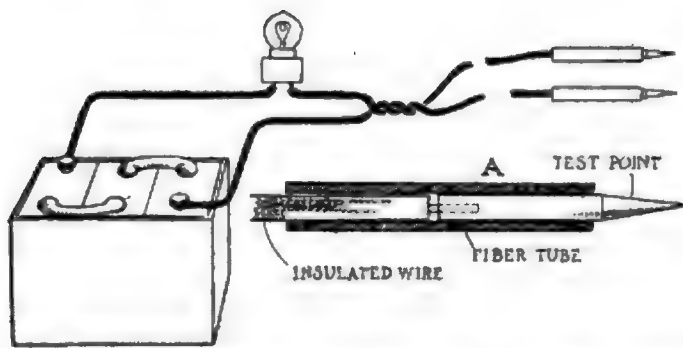
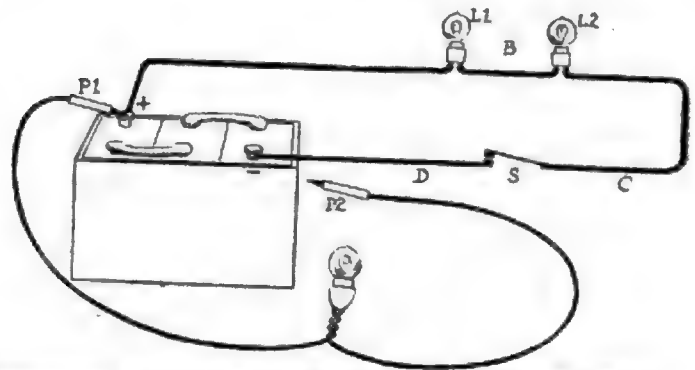


Fig. 1—At the left, a test lamp and battery for locating troubles in electric system. The battery in the car usually can be used without removing it from the car. The detail shows a special test point that can be made for repair shop use where frequent testing is necessary. For the motorist, a length of lamp cord usually will serve. Fig. 2—At the right, using a test lamp for locating troubles in a series lighting circuit.



bulb, or one of improper voltage, blackened or worn out bulb, partial short circuit on some part of the lighting circuit.

Starting Troubles

Starting Motor Does Not Crank Engine

If the starting motor refuses to operate when the starting switch is closed, the trouble is likely due to one of the following causes:

- (a) Discharged battery, which may be determined as explained above.
- (b) Open circuits due to loose connections at battery, starting switch, motor terminals or ground connection; very poor contact in starting switch; dirty or roughened commutator; worn brushes; brushes not fitted to the surface of the commutator; improper pressure on the brushes; armature or field winding burnt out.
- (c) Short circuits or grounds in starting switch, wiring or motor, due to insulation being worn off of the conductors by metal cleats, sharp bends around the metal covers, insulation destroyed by heat, water and grease, etc.

Starting Motor Cranks Engine Slowly

When the starting motor cranks the engine below the proper speed, it may be due to any one of the following causes:

- (a) Battery partly discharged or very cold, thus lowering its efficiency.
- (b) Poor contacts in motor circuit, usually at battery terminals, starting switch, contacts, or the commutator of the motor. In fact any condition which will not result in an abnormal amount of resistance being introduced into the circuit.

Simple Testing Equipment

A 6-volt lamp in a small socket and provided with testing points connected to it by means of lamp cord may be used in locating practically all kinds of trouble on a starting and lighting system when the operator is familiar with the wiring diagram of the system or has at his disposal a diagram which he can readily follow. For repair-shop use the test points may be made similar to the ones shown in Fig. 1. For emergency use, any two lengths of wire with bared end usually will serve.

How to Locate an Open Circuit

The use of the test points in locating an open circuit may be shown by taking the circuit shown in Fig. 2. Assuming you are going to use the battery in the car in making the tests you may proceed as follows: Connect one test point to the positive

terminal of the battery and the other point to the negative terminal. With these connections made the test lamp should light up to its full candlepower unless the battery is in a discharged condition. Assuming the battery is found to be properly charged move the test point from the negative terminal of the battery to the terminal of the switch where the wire D is connected, and if the lamp lights the wire D is O. K. Next move the test point P2 to the terminal of the switch where the wire C is connected and if the lamp lights with the switch closed, the switch is O.K. Next move the test point P2 to the right-hand terminal of lamp L2 and if the test lamp burns the wire C is O.K. Next move the test point P2 to the left-hand terminal of the lamp L2. When this last connection is made the test lamp and lamp L2 will be connected in series across the terminals of the battery. If lamp L2 is O.K. the filament of the test lamp will brighten up but not to the same extent it did when connected to the right-hand terminal of the lamp. Next move the test point P2 to the right-hand terminal of lamp L1 and if the test lamp glows the same as when the test point P2 was connected to the left-hand terminal of lamp L2 then wire B is O.K. Lamp L1 may be tested by moving the test point P2 to the left-hand terminal of the lamp which puts the lamps L1 and L2 both in series with the test lamp and the test lamp may not light at all due to the added resistance in series with it. Lamp L1 and wire A may be tested by placing the test point P2 on the negative terminal of the battery and the test point P1 on the left-hand terminal of the lamp L1 and if the test lamp lights wire A is O.K. Then move the test point P1 to the right-hand side of the Lamp L1, which places the test lamp and the lamp L1 in series and if the lamp L1 is O.K. the test lamp will light, but not at full voltage due to the resistance of lamp L1 in series with it. Should the test lamp fail to light under any of the above conditions, it is an indication that there is an open circuit between the last point where the test lamp would light and the first point along the circuit where it failed to light.

Testing for Short-Circuits

Short circuits between two wires which are normally insulated from each other may be tested for with the test lamp and battery shown in Fig. 1, by placing one test point in contact with one of the wires and the other test point in contact with the other wire. If the test lamp lights it is an indication that the two wires being tested are electrically connected or shorted. In making this test be sure that the wire or circuits being tested are not normally connected. This may be determined by a thorough inspection of the wiring diagram.

NEXT WEEK

The next regular installment in this series will appear in the issue of MOTOR AGE for April 12 as a discussion of generator drives.

Variety as the Spice of Motoring

What Women Say of It

IT was rather an event in her life back in 1909 to take a motoring trip, even when it was just to town, for motor cars had not been in her town long and she was newly acquainted with them. But it became the custom for her to start on a short motoring trip of at least 10 miles every evening about 7 o'clock. Being a humanitarian and all that she always tried to see that the car was full and for this reason much variety in the way of companionship in motoring was added.

Hard to Dress Properly

She invited several friends one evening as usual, and the car was turned toward another town, about 10 miles distant. Being new at the motoring game as yet, there was also variety in the motoring costume, and she likes to tell of that. She herself had an invisible hair net over her hair with no other head protection, a linen duster such as she had been accustomed to wear when being courted on the dusty country roads in a horse and buggy turn-out completed her protective ensemble. Her companions had more choice, it seems. One wore a winter coat—it was the middle of summer—with a ribbon boudoir cap; the other compromised on a light, summer shawl that could be slipped over the head when the outskirts of town were reached. All three, by the way, were accustomed to appear in society without making breaks that would prevent their reappearance there, which shows the extended variety of their motoring clothes.

All went well until they started back. A mere mau was driving, and he, too, liked variety, so thought he would try "that new cut-off through the lane." There was more than one cut-off, however, and the lane became a mere trail through the woods with fresh stumps jolting the living out of the motorists.

They became stalled. The mere man sounded the mud hole and went on—very silently—to look for a span of mules. The three women were left in the pitch black woods with prospects of an all-night stand. One suggested that they pray for help, but she was overruled by the other two who thought it more advisable to go up the complimentary road and look for mules. They returned home by mule power, the driver of the mules guiding his noble beasts from the advantage places of behind the wheel. Mudholes and stumps had given too much variety.

River Crossing Scarey

2—She takes a trip to Tennessee every summer, and as it is taken over the roads of to-day and in a car of to-day it is very uneventful except the crossing of the Mis-

issippi. That to her is always a thriller, and she breathes a sigh of relief when the car and all in it are on the other side safely. Last summer had it not been for the high-powered and quickly-responding engine, she says, they all would have rolled into the river just as they drove off the ferry. The men had carelessly tied the ropes and left too much slack, allowing the boat to push out from the bank just as the car was about half way on the planks leading to the bank. The driver felt the car give way and realized the danger in time. The car responded so quickly as to almost clear the planks with a bound, and it was really all that saved the situation, she feels. Since then she has believed firmly in the six-cylinder and the high-powered car for safety.

The Thermos bottles and drinking cups are of great pleasure along the way on these summer trips, especially so since two small children make the trip also.

3—Of more ambitious motoring is this

From the Woman's Viewpoint

visitor who likes transcontinental trips. She went across the country in a Ford recently, an account of which trip will be published in an early issue. And as for variety, you can be sure that she had it for she drove the car herself and was without companions for the greater part of the trip.

Variety Serious Sometimes

But the variety was very pleasant afterward—all of it, even though some of it could never be classed as pleasant if it were not for the softening hand of time. For instance a peculiar wabbling of the front wheel showed her a broken cone when she was 55 miles away from the nearest garage. She had little experience in such matters, none in a case of this kind, but was compelled to remedy it herself or stay there indefinitely. How she remedied it and how she met other incidents that lent variety to her motoring you will have opportunity to read of later.

To sum it up she says that the pleasure derived from the trip overcame all the troubles and excitement—after the trip had ended.

4—Her father gave her a small runabout when he bought a seven-passenger, and she thought she was just fixed to have the

best time ever. The runabout was red, two-seated and a tolerably good traveler. She lived in a town of about 6000 and took music lessons in a large town some 12 or 15 miles away. The family, too, thought this would be just the thing, for taking music lessons as she did at this distance she would have such a fine chance to get in some really good motoring.

She would have preferred an underslung herself, she admits, but even though the runabout was not the ideal of her heart she knew she could make it do. Twice a week she drove it over for her music lesson, and what she didn't meet in the way of variety wasn't worth comment.

Not Acquainted with Car

In the first place she knew practically nothing about what the hood of the car covered, and naturally it became necessary for her either to remain stalled for 2 or 3 hrs. until someone could come and get her or else learn something about the car. Not that the car would stall purposely or without reason, but naturally it met some rather rough treatment.

She tells of one eventful day on which the car stalled just at the critical moment at the foot of one of the numerous hills. She doesn't know to this day what she did to cure its stubbornness, even though she has had experience with other cars, but that is probably due to the time that has elapsed since she did the job. At any rate, she used a hairpin. Strange as this may seem, she has found it advisable since to use the same instrument of usefulness on her car. For cleaning spark plugs in emergencies she thinks nothing can surpass it—in ingenuity at least.

There was a good deal of variety in the way the runabout rode and the way the seven-passenger rode. For instance, it would never do for her to wear her best clothes, not because she had to tinker with the car so much but because the runabout seemed to have an appetite for mudholes and took them so swiftly that a sheet of muddy water often was lifted higher than the windshield.

Traffic Control Has Effect

5—In a little Illinois town the city authorities have tried the plan of planting poles in the center of each street intersection so that drivers will take their cars around the intersection in turning from one street into another instead of taking a corner very sharply. The plan works very well now, but for a while there was quite a bit of excitement connected with those poles, and some of those who had the most excitement from it were the women who drove cars in the town or vicinity.

One, it is told, found a great deal of trouble in getting around the pole, owing to the length of her car. She had no serious trouble, but found it required a little more skill to get around, especially on the streets that had much grade, without raking either the pole or the corners, and that would never do, you know, for a good driver to do. So she didn't.

That some of the town's drivers did find it impossible to get around the pole you may be sure, for it is said that many a morning saw the fallen pole lying in the center of the street intersection.

Hills Are Bugbears

Hills of any kind, whether they are right in town or outside, seem to furnish the greatest variety, from the woman's viewpoint, and there are very few women who do not dread them. In many localities where there are hills of any size the number of women drivers is noticeable for its minority as compared to the total number of drivers there. However, the women everywhere are gaining more confidence in their driving, and this, more than anything else, will remove the hill bugbear and enable them to get only the desirable variety from driving.

6—There are some parts of our glorious country, you know, that have more sand in their roads than do others. Well, it is of one such parts that this variety is recalled.

The roads were of two general kinds—those that had been built on the old beds of abandoned railroad rights-of-way and those that were bordered with the big drainage ditches that went with that section of the country. A beginner liked neither, and with reason. The slightest turn of the steering wheel beyond the necessary turn made one think the ditch was the ultimate destination, whether it meant danger or not.

Well, women learn to drive on these roads, and they learn to become good drivers, too. The beginning is always the worst, and it is especially hard for the one who is a mere bystander, so to speak, with no way to jump but a ditch full of water. The water often carries blooming plants, but this seems to make no difference, and the woman who first drives by a road of this kind doesn't see the flowers.

When Speeders Go By

One woman tells that as she was taking her first lesson, a big six-cylinder monster came speeding along the middle of the road. Well, she didn't try to pass it. She just elung to the edge of the road and cringed while the car passed her. These roads during the last year, however, have been improved wonderfully, and she believes that if she should learn to drive again the learning would be much easier and take much less time.

7—While we are on this phase of motoring—variety—it might be good to consider the variety of clothes suggestions received from time to time.

"If a woman wants to really learn to

How's This?

This is part of a letter from a girl who drives from one state to another as a matter of course, and she has had a good deal of experience in driving. Perhaps what she has to say will help you.

"I always equip one of the side pockets with a sort of 'Safety-First' outfit, consisting of small bottles of turpentine, peroxide, iodine, bandages, scissors and anything else that might be needed in case of accident."

"Probably the thing that makes driving easy with me is that I have a way of shifting the gear with my foot. Any car that has the 'H' shift can be managed in this way. It enables one to always keep the eye on the road and does away with the possible missing of the lever and the strained position one sometimes must get in to shift it with the hand."

"Then, too, I've found it quite an advantage to attach a narrow tape to the side of the shirt—long enough to be tied loosely around the ankle. This prevents the shirts from becoming entangled with the levers and also from blowing, if the windshield is open."—N. L. D.

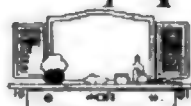
"P. S.—Forgot to say I strap my jointed fishing rod and rifle to the crossbars in the top."

drive, and drive efficiently, she must get rid of her skirts and wear khaki breeches," says one.

"A woman should never attempt a transcontinental trip in any kind of clothing but khaki. That is the best material. And if she will adopt the costume of her more old-fashioned sister who rides the horse astride, so much the better," another suggests.

Though practically as many again do not agree with these two, the general belief is that a woman cannot wear her best clothes and get the full amount of pleasure from motoring that is her due. Neither does she wish to look dowdy. The most conclusive suggestion is that she wear the loosely fitting coat, models for which are so numerous in this time of universal motoring, and closely fitting hat, with some device to keep her skirts from becoming entangled in the levers, brakes and so on. On these pages we have one such device suggested.

Beauty Hints for the Woman Motorist



ONE of the greatest objections women have to the extended motoring trip is that it is hard on the complexion. Also it is hard on the health, in general, they say.

The veteran motorist, however, dreads a long trip no more than she does a short one. For in her motoring she has found that ordinary care, consistently observed, can do wonders in this respect. The general advice from women who motor is that a thin coating of good cold cream should be applied to the skin before starting on a motoring trip of any length. This serves because it keeps the harmful effect of the wind, naturally incited by a swiftly moving car, from drying out the pores of the skin, the first cause of many of the ills of exposure to the wind and sun.

An Original Suggestion

One of the most original suggestions from woman motorists is that the use of red as a color in the veil or coat will prevent any burning or tanning. This does not necessarily mean that red in its most intense qualities should be used, though this perhaps would be the most perfect protection, according to the theory on which this suggestion is based. Yellow is worn very much now and so is orange. Perhaps this is due unconsciously to gradual recognition of its protective qualities.

Women have been known to wear thin chiffon veils of red through the desert and find no more change in their skin than would have come had they remained at home. It might be worth trying, anyway.

But the cold cream is the usual method. It should be applied smoothly, and the superfluous cream can be removed with a soft cloth. A light dust with a pure powder completes the protection. Care should be taken in the selection of cold cream and in the powder which you use, or else it will do more harm than good.

The kind of soap you use has a great deal to do with the effect a motoring trip has on your complexion. You often hear the remark that such and such a soap ruins your hair and skin. This is not so far wrong. The skin responds differently to different soaps, and you will find, if you care to experiment, that one kind of soap will make your skin tan and even chap, on a hot summer day, when another will not affect it in the least.

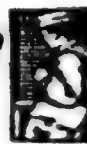
Choosing Soap by Skin

Ordinary skin should have super-fatted soaps. Moist skin should have glycerine or alkali soap. If you can find no soap agreeable to your skin, or prefer something else, use 1 lb. bran, ¼ lb. starch in bags, 2 oz. in each bag. Put the bags in boiling water and, when cool, squeeze them out. They are for use as wash rags. Besides cleansing, this softens and whitens the skin. You could prepare these bags before starting on a long trip, and take them with you without further attention to them.

One of the best things you can do is to be as comfortable as possible. Fatigue and strain of position make lines in the loveliest of skins. Don't shun cushions if the car seats are too low, too high or too hard, and remember the Thermos bottle and lunch basket.



The Readers' Clearing House



READER AIRS VIEWS ON BODIES Believes Manufacturers Set Aside Convenience for Style

Los Angeles, Cal.—Editor *Motor Age*—The writer from Warner, S. D., said much for the benefit of the touring public in the way of more convenient touring cars for traveling and camping. In my experience on one of our trips of over 3000 mi., I learned much of convenience for quick service. A tent is too bulky and takes too long to set up, though a canvas large enough to cover the car is a good thing to use. This we also used for covering our baggage and provisions.

The back of the front seat cut down or made like a trap door that can be let down in a minute for a bed at night or to rest at noon, is essential, though there are no manufacturers building them this way that I know of.

Before purchasing a new car recently, I wrote the manufacturer the way I would like to have the car built, also some criticisms. One particular part was the narrow windshield, "Streamline," which they boast of. But the real fact is a stream line of cold wind back of my neck which gives me a severe cold every time I drive any distance; catering to style instead of comfort. There is no place for the tools except under the front seat and that cannot be looked. I am now making two drawers under the cowl, one for tools and the other for sun glasses, tire gage, patches and light things that can be locked up and can be gotten at quickly.

When I have five passengers, there is no room left for even a lunch basket. I am not allowed to use the runningboard to carry baggage on. Even if I did, the doors are hung so that I could not use them.

The hoods are made so large now that it is impossible to lay a suitcase on the fender, though there is much waste room under the hood.

I received a very polished reply from the manufacturer with a concealed hint that he knew his business.

Motor Age, please open the way for a little more public sentiment.—W. H. Beard.

Editor's Note—*Motor Age* would like to hear the pro and con of this story. You who are supporters of the present type of body construction might be willing to answer this critic. Let's have more.

What Not to Ask

Editor's Note—In preparing answers for the Readers' Clearing House of this week's issue, the editor came across a surprising number of inquiries asking how fast certain models will go and how much faster they would go if certain alterations were made upon them. These questions are quite out of our grasp, in fact they can be answered only by those making such changes.

When manufacturers have made official speed records under the sanction of the American Automobile Association, we will gladly print the speed figures made during that test. Where no tests have been made there is no source of positive information regarding these car speeds and we see no reason why we should guess at it.

Furthermore, the idea of anybody estimating within 5 or 10 m.p.h. how much faster a car will go with aluminum pistons, higher gearing, etc., etc., is absurd. A poor mechanic may install new parts intended to increase the speed and do such a sloppy job of it that the speed will, in reality, be reduced.

The same thing applies to the maximum revolutions per minute of an engine. Two engines of exactly the same model may have a difference in maximum speed of 200 r.p.m. Furthermore, when the engines become used, the maximum changes. It depends to such a great extent on the adjustment and general conditions of the engine that no reasonably accurate figure can be given. Another thing we cannot give you with any accuracy. That is car weights.

PECULIAR TROUBLE IN MAXWELL Possibly Due to Dirty or Oily Brushes in Armature

Kansas City, Mo.—Editor *MOTOR AGE*—I am having a peculiar trouble with the Simms-Huff generator on my Maxwell 25, 1916 model. When I start the engine by hand, the ammeter does not show a charge even though the engine is speeded to the utmost. If lights are switched on with engine still speeding the ammeter shows discharge which, of course, shows that there is absolutely no series circuit from the generator through the cut-out relay. Now, if the engine is stopped but started with the starting motor, the ammeter shows a good charge immediately upon the starting of the engine. When the engine has been running until it is thoroughly warm and is stopped, the ammeter will this time show a charge when the engine is started by coasting and letting in clutch. What is the trouble?—H. J. Halley.

1—It is possible that the armature brushes are dirty and that, while the generator is cold, no current passes through on account of dirt or oil, but as soon as the generator warms up the brushes wipe this oil off and allow the generator at least some current.

METHOD OF COMPRESSION TEST Dry Cells Not Suitable for Lighting— Counterbalancing Explained

W. Brooklyn, Ill.—Editor *MOTOR AGE*—I have an Overland 1913 Model 69 T. What should the compression of this car be, and how can this be tested?

2—I fastened an old valve from an inner tube in an old spark plug, and put it in place of a spark plug on each cylinder. I put a tire tester on this, and turned the engine over slowly by hand, and the needle on the tire tester would go up to 55 lb. every time. Is this the way to test compression? This car has been run 10,000 mi.

3—The engine has a mechanical oiler to oil the pistons and timing gears, and I would like to know how far it should run on a gallon of cylinder oil. The crankshaft bearings are oiled by splash. The car has been running about 200 mi. to a gallon. Is this too much oil?

4—I would like to put electric lights on this car and want to know if a multiple dry battery would be suitable to light them, in place of a storage battery? I use my car all winter, and as I have no generator on it, I could not use a storage battery in winter, therefore, I would not have any light in winter unless I would use a dry battery.

5—How can one tell when the magneto magnets need recharging? What does it cost to have them recharged?

6—Give the name of a good nickel polish for shining dull nickel trimmings.

7—Why are crankshafts counterbalanced? Is not the flywheel made for this purpose?

8—Why do some engines have four valves in a cylinder? How do they work? What is the advantage?

9—Can the Owen-Magnetic transmission be put on any car? If so, does it have to be built in at the factory, or can it be put on an old car? What is the price of this?—Wilbur Vickrey.

1—The compression pressure should be 55 to 60 lb. This can be tested very readily by screwing in any gage of the proper capacity in the spark-plug hole or in the hole of the relief cock, then turning the starting crank by hand and note the position of the indicator on the gage.

2—A good way to test compression, although not as accurate as it might be with a more finely calibrated gage.

3—An average of 200 mi. per gal. is good. It is not using too much oil at that rate.

4—Dry batteries can be used for lighting, but the capacity in electrical units in comparison with the price is so small that it is an expensive investment. You can use a storage battery in winter, if you take the precaution of testing it every few days with a hydrometer. It can drop to a hydrometer reading well below 1.225 and be immune from freezing in the coldest weather you would encounter in your locality. Or even without a hydrometer, you can run until the lights are very perceptibly dimmed without danger of freezing and then have a new charge put in, but to run this low is not good for the plates.

5—The magnets are not weak enough to do any harm until the action of the engine is interfered with. Should there be an appreciable power loss and after a very thorough inspection you cannot find the cause to be elsewhere, it can very likely be in weak magnets. If the engine

magneto will not deliver an efficient spark at the spark plug by cranking the engine by hand unless assisted by the dry cells.

With the car idled down to 4 m.p.h. in high, the engine is still turning 160 r.p.m. As can be seen, this speed is considerably above 75 r.p.m. at which speed a good spark is obtained from the magneto.

FOUR-WHEEL DRIVE IS EXPLAINED

Illustrations and Descriptions of Two Such Chassis

Goldfeld, Is.—Editor Motor Age—Explain how the Delco starter on the Model 37 Oakland can be removed.

2—When removing the armature, will it disturb the timing of the distributor?

3—Illustrate how the driving and steering mechanism works on the F.W.D., and Jeffery four-wheel drive trucks.—C. Hanson.

1—First remove the pin from the collar on the armature shaft between the armature and the spiral gear case, slide the collar ahead as far as possible; then disconnect the bolts which hold the generator at the bottom and then the rear. The complete generator and starting motor can be taken out then from the side.

2—This will not disturb the timing of the distributor if, when No. 1 cylinder is on dead center, the distributor cap with the wires attached is placed so that the wire attached to No. 1 post and to No. 1 cylinder receives the spark by coming in contact with the rotor. If you throw the spark out of time it is simply a matter of setting the points for any one of the cylinders within the distributor at the place where the contact is made, previously having placed the piston in that cylinder at top center. The distributor head is distinctly numbered and the cylinders fire in the following order: 1-3-4-2, No. 1 cylinder being considered the one nearest the radiator.

3—Both operate on the same principle, although the medium of power transmission from the gearbox to the wheels is different. A plan view of the chassis of the F. W. D. truck is shown in Fig. 4. You will note that drive from the engine to the gearbox follows conventional practice. From the rear of the gearbox a silent

chain transmits the power to two shafts, one leading to the front axle and one leading to the rear axle. Here drive is conducted conventionally through bevel

IN WRITING AN INQUIRY to the Readers' Clearing House Department

DESCRIBE THINGS COMPLETELY!

If your car is giving trouble, tell us all about the trouble and what you have done to try to remedy it. Always bear in mind that we are not looking at your car when we are reading your inquiry. Try to picture everything to us as we might see it if we were looking at your car. You understand it. Make us understand it.

Do not write in and say, "My engine has developed a serious knock. What is the trouble and how can I remedy it?" It is as impossible to give an intelligent answer to such a question as it is to answer the question, "Why is a mouse?" Tell us where the knock is, what it sounds like, what effect it has on the operation of the engine, under what driving condition it is most evident, etc. Let us have some tangible information to work on.

Do not ask us questions concerning motorcycles and motor boats. Our field does not cover these industries. Do not ask us for working drawings of engines, gearsets, etc. We endeavor to conduct an information department, but not an engineering department of such a nature. We cannot design the mechanical units of a car for you. This also applies to specifications for speedster bodies to be applied to touring or roadster equipped chassis. We will gladly give a general plan of a body, showing how it might appear when complete, but we cannot furnish complete patterns and working drawings for the construction of these bodies.

gears and a differential to the axle shafts. In the rear axle there is nothing out of the ordinary. In the front axle there are ball and socket universals in the yokes connecting the wheels to the axle. Drive is conducted through these universals to the wheels and because of this universal action the wheels may be turned to the left or right for steering purposes without hindering the transmission of power to the wheels.

A plan of the Jeffery type of quad is similar to this. Here again drive from the engine to the gearbox is conventional. The propeller shafts are gear driven from the layout of the gearset, this construction bringing the forward one sufficiently to one side to clear the engine. Three differentials are employed, one on each axle and one in the gearbox. Both axles are dead and are fitted with steering knuckles. The transverse driving shafts at either end are placed above the axles and springs and have universals just inside of the wheels and directly over their steering pivots, as shown by the sectional view in Fig. 3. The driving pinion is supported from the steering knuckles between two taper-roller bearings, and drives an internal gear mounted in the enlarged wheel hub. Bolted to this large hub and the wheel itself is a pressed-steel drum for an external brake, a dust-excluding felt packing being fitted between the drum and the ring gear.

OIL LEAKS FROM TIMING GEARS

Possible That Lubricant Has Been Inserted in Wrong Place

Tuscola, Ill.—Editor Motor Age—My father has a Buick C 55 which throws cylinder oil by means of the fan. It is a great annoyance on account of the oil on the fenders. The oil appears to come from around the crankshaft bearing or the belt wheel. Can you suggest a remedy?

2—This car is equipped with a Marvel carburetor which worked good for about one year. Then the air spring which controls the air valve seemed to crystallize and we can not get one to last over about 2 months. The garage men say it is due to popping back. It pops back only on slowing down.

3—At what speed does the D 45 engine develop maximum power?

4—Do you approve of using wax on cars or not? Will it crack the body?—Ward Morla.

1—Leakage of oil from around the fan pulley is very likely due to the fact that someone endeavored to fill the timing-gear case of the engine through the right-hand wing plug, which should have only one or two tablespoonfuls of oil every 500 mi. The timing gears should be lubricated with heavy steam cylinder oil, introduced through the left-hand wing plug in the timing-gear case. It is also possible that the front main bearing of this engine has been removed at some time and in replacing it the mechanic did not use sufficient care to see that the main-bearing shims were drawn tightly against the crankshaft, in which case engine oil from the crankcase might work forward into the timing-gear case and overflow.

2—You very probably need a new jet to take care of the low grade of fuel now available. The carburetor was designed to handle gasoline of much higher test than

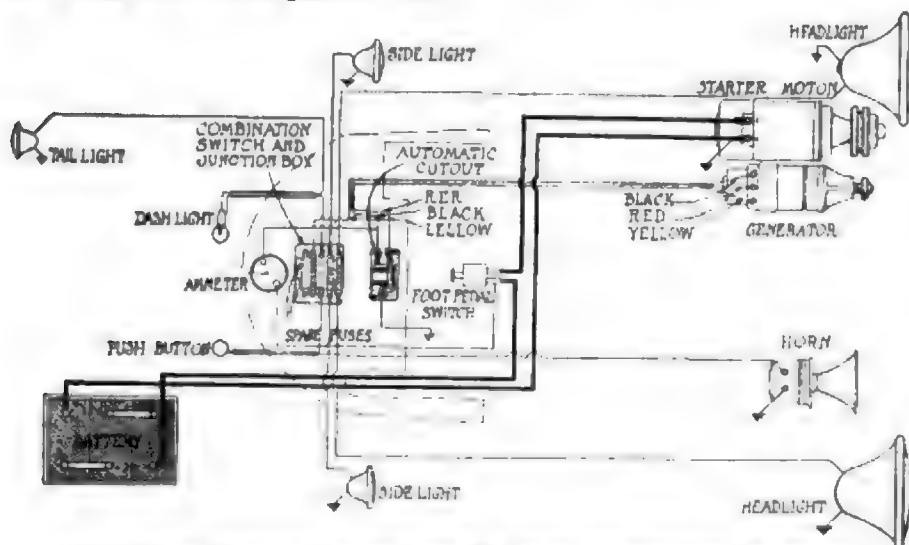


Fig. 2—Wiring diagram of Overland model 79 showing wire connections for ammeter

is now available. The carburetor makers will furnish the necessary parts for the alteration.

3—The model D-6-45 engine develops its maximum of 48 hp. at 2200 r. p. m.

4—Yes. It will not crack the body, but will prove a protection to the finish.

WIRING OF OVERLAND MODEL 79 Method of Connecting Ammeter Correctly Explained

Lake Village, Ark.—Editor MOTOR AGE—Send me a diagram of the electrical equipment of the Overland speedster Model 79 with Gray & Davis equipment. Send me diagrams and instructions for putting same back in place so that the ammeter will show positive to positive and negative to negative correctly.—E. E. Clay.

A diagram of the electrical system is published in Fig. 2. Regarding the assembly of the ammeter it is a simple matter to assemble this positive to positive and negative to negative. Fasten one of the ammeter wires to the black wire, as shown in the diagram. Connect this ammeter wire to either post of the ammeter. Then connect the other ammeter wire to the negative wire leading out of the pedal switch. This is the wire which leads from the pedal switch direct to the battery. Connect this wire to the other post of the ammeter. Then, after all wiring is completed, start the engine, speed it up to a charging speed and watch the action of the ammeter. If the needle registers charge it is properly connected. If it registers discharge, then the ammeter wires should be reversed one for the other.

READER NEEDS SHOCK ABSORBERS Not Advised That He Buy New Springs for Easy Riding

Los Angeles, Cal.—Editor MOTOR AGE—I like the sound of an exhaust whistle attached just in front of the muffler. Is this a success? I frequently see them lying in junk piles which makes me suspicious. I am aware that such noise is against the laws in some cities, but most necessary in the mountains.

2—Are there any springs that could be attached to the rear springs of an Oakland Six 34 to make it ride easier with a light load and are they advisable?—Wilson H. Beard.

1—Exhaust whistles are successful. Those you have seen in junk piles were probably there either because state or city laws prohibited their use or they were worn out.

2—Rather than try to secure the wanted resiliency with lighter springs it is suggested that shock absorbers be applied. Take, for example, the coil-spring type of

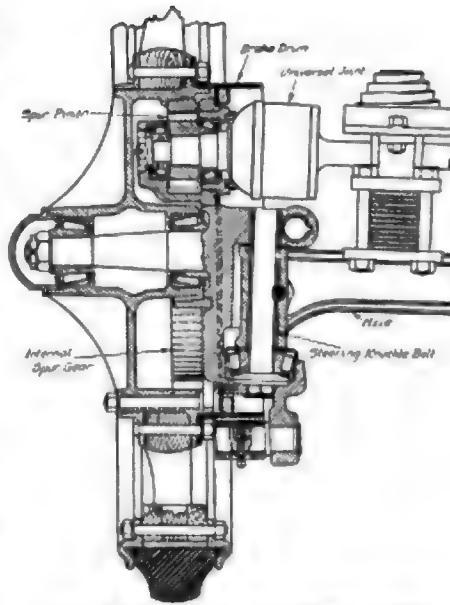


Fig. 3—Layout of front-wheel driving mechanism of a quad drive truck. The universal conducts drive to a pinion operating an internal gear

shock absorber, which takes the place of the rear spring shackles. In these the light road shocks are taken up without any perceptible action taking place in the main springs. Then if a heavy shock is encountered a counterspring within the shock absorber minimizes the recoil, so that the rear of the body is thrown a great deal less than it would be without shock absorbers. In the types which work between the spring centers, the shocks which would tend to throw the rear of the car when driven under light load are checked, either by friction, by springs or by an air or hydraulic-plunger action, thus making the car much easier riding. Shock absorbers would cost you less than special springs and serve your purpose better.

BEARING ADJUSTMENTS ON BUICK Repairing Scored Cylinders by Insertion of Metal

Texarkana, Tex.—Editor MOTOR AGE—Publish instructions for adjusting the bearings in the rear axle of a model 20 Buick.

2—Is there a preparation on the market for filling up a scored cylinder? All the cylinders are good with the exception of one which I do not want rebored. Scoring caused by the piston pin working loose. The cylinder is scored to about 3 inches of the top.—J. C. Hutchison.

1—The differential bearings can be adjusted by removing the cover plates and

locking the fingers and then turning the adjusting sleeves which carry the bearings either to the right or left, as the case may be. Pinion shaft bearings are adjusted by removing the lock nut on the forward end of the pinion flange, loosening the lock nut on the forward end of the pinion shaft and turning the adjusting sleeve in the proper direction.

2—The work can be done with success, but the cylinders must be sent to shops equipped for the work. A silver and nickel alloy is applied electrically by this process. You will find the names of several concerns which specialize in this work in the advertising clearing house section of this issue.

Alterations on National

Bartlesville, Okla.—Editor MOTOR AGE—What alterations were made on the oiling system of the National car Joe Dawson drove at Indianapolis in 1912?

2—Was it originally a 4-40 stock car? Give as many details as possible.—Paul E. Byron.

1—The oiling system was augmented by the use of a hand pump, which drew oil from the supply tank and directed it into the crankcase sump. Otherwise the engine was stock.

2—Yes. The gearing was different and, of course, there was a racing body. See answer to inquiry of Douglas Norsworthy below.

National Gear Ratio

Muncie, Ind.—Editor MOTOR AGE—Did the National racing car which Joe Dawson drove on Decoration Day, 1912, at Indianapolis, have a stock gearing?

2—If not what was the gearing on it and what was the gearing on the National stock cars of that year?—Douglas Norsworthy.

1—No.

2—The particular car referred to was geared 14-42, or 2.21 to 1. The touring cars of that model had a stock ratio of 15-45, or 3 to 1, and the roadsters 18-45, or 2.5 to 1.

Stutz and Mercer Data

St. Louis, Mo.—Editor MOTOR AGE—Give me the bore and stroke, horsepower and piston displacement of the Mercer 1917-model runabout, and the Stutz sixteen-valve four-cylinder engine; also tell what each car is geared at, and which car is the fastest of the two cars on the road.—J. B. Wahl.

The Mercer engine has a 3¼-in. bore and 6¼-in. stroke, giving an N. A. C. C. horsepower rating of 22.5 and a piston displacement of 297.08 cu. in. The Stutz sixteen-valve engine has a 4½-in. bore and a 6-in. stroke, giving an N. A. C. C. horsepower rating of 32.03 and a piston displacement of 358.32 cu. in. The Mercer is geared on high at 3.22 to 1 and the Stutz at 3.5 to 1. There have been no tests which would prove which car is the faster on the road.

Size of Ammeter Wires

Webster City, Ia.—Editor MOTOR AGE—I have a Hudson 6-40, 1915 model, on which I had installed an ammeter. The repairman cut quite a heavy copper cable and used a much smaller copper cable to the ammeter. I have always thought he should have used the same sized cable as he cut.—H. F. Price.

It is not necessary to use a heavy cable in ammeter connection. In ordinary connections the ammeter gets a shunt current.

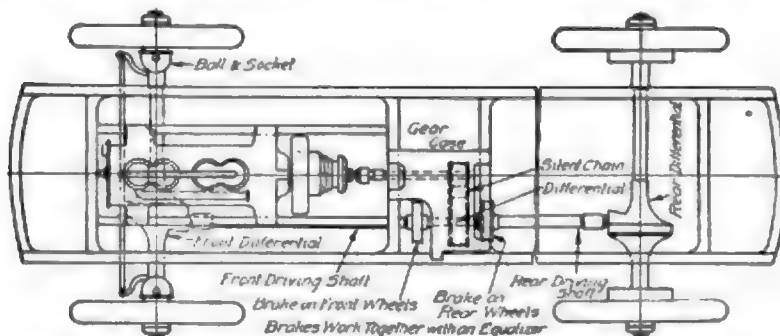


Fig. 4—Layout of a four-wheel drive truck showing drive shaft arrangement to front and rear axle

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ANNOUNCEMENT

Next week Motor Age will publish a story as opportune as that of the American aviators this week. Read it and learn how motors serve an army. It is by W. F. Bradley, Motor Age's European correspondent.

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1900 Euclid Avenue
Cleveland, O.



have compared with similar tests made in their shops at practically sea level.

One important firm took its entire laboratory staff, an electric brake and all its test shop equipment to a height of 8,000 feet, twenty trucks being necessary to carry the men and material. They remained on the mountain fifteen days, during which they carried out every kind of test and obtained most elaborate data. On another occasion twelve manufacturers united to carry out similar tests on the mountain, these occupying an expert staff for more than a month. In general, it was found that at 8,000 feet above sea level there was a falling off of 20 percent in the power developed by the engine. By increasing the compression, by giving much greater ignition advances and by carburetor adjustments, giving a greater amount of air, the whole of the loss was regained.

Carburetors Make Problem

A large amount of work has been done in carburetors. Obviously a mixture which is satisfactory at sea level is unsuitable for the rarefied atmosphere at 10,000 feet. Alpine touring already had shown this, but the conditions on an airplane are very different from those on motor car. A further problem was to provide a suitable type of variable cooling and a carburetor which would give full power at extremes of temperature. Variable cooling is so difficult to obtain that its utilization has been abandoned as far as possible, the aeronautical authorities preferring to work on the lines of a carburetor which would give a correct mixture under a very wide range of temperatures. A fast scout machine, for instance, will climb to a height of 20,000 feet in an hour, during which time the cooling water is liable to rise to 150 deg. F. A quarter of an hour later it may have dropped to a few hundred feet and the engine have cooled off to 40 or 50 deg. It has been possible to get carburetors, which, after such rapid cooling, would allow the engine to pick up instantly and develop full power without any hesitation. This is done without any arrangement to preserve the cooling water at a good average temperature.

Radiator thermometers are used somewhat extensively, particularly for twin engine machines, where it is important that the two powerplants should be kept as closely as possible in the same condition. The general plan is to take the temperature of the water at the outlet from the cylinders and not in the radiator. This is particularly necessary where two, three or four engines are used with a common radiator.

During exceptionally cold weather trouble has been experienced on air-cooled engines with the freezing of lubricating oil, and on water-cooled engines with the freezing of water in the pump and pipes. Oil freezing takes place in the pipes while the machine is in the air, unless very careful provision is made to protect these pipes from the draft of the propeller.

U. S. Is First at Plants

Makers Promise Government's Orders First Consideration in Shipment

Middle West Factories Prepare to Give Entire Output

CHICAGO, April 9—The declaration of war has found the motor industry prepared and ready to put forth its every resource to the aid of the country. The machinery of every plant has been enlisted and indexed so that the Government knows just what it can obtain and how quickly. Some of the makers already are turning out munitions, airplane engines, trucks and other war needs which their plants make them especially fit to produce.

A certain secrecy is maintained, and for this reason the full extent of the military preparation made cannot be given. But it is known that one of the large parts companies is making shells; at least three of the motor car factories are making munitions in a small way to train the men and have machinery in readiness; another manufacturer has an airplane engine which is to be made in large quantities; and other factories are engaged in similar activities. **Organizations Co-operate**

The 101 members of the National Automobile Chamber of Commerce pledged their fullest co-operation several weeks ago. The Society of Automobile Engineers, through a division of its Standard Committee, has been co-operating with the War Department in drafting specifications for army motor trucks, and these specifications even now are on the desk of Secretary of War Baker, waiting for consideration.

The factories of the Middle West, too, are ready to give the Government the aid of their resources. The motor car and parts producing factories in the territory around Chicago are alive to the value of their services to the Government and have offered all or part of their equipment to the Government at any moment that they are needed.

One of the largest passenger car and truck producers has offered his entire output. Dealers and customers have been notified that a Government call will receive preference and that other orders will be canceled if necessary. Some factories are encouraging the enlistment of their men, and practically all give their men assurance of consideration in the way of employment on their return from the front.

The Moline Automobile Co. has had good schooling in the manufacture of munitions during the last year, having made 8 in. shells for the British government at the rate of 300 a day. The contract has expired, and the plant is at the immediate disposal of the United States. President W. H. Vandervoort is a member of the special committee on standardizing munitions

for the Government and of the preparedness committee of the S.A.E.

The Buda Engine Co. has offered its entire output. It has notified all customers that the Government will have precedence over all orders. It considers that the present disposition of its product is of immediate service value since much of the Buda firm's product is going into vehicles that will be of use to the Government.

The Waukesha Motor Co. holds the same view. Waukesha engines are going into farm tractors, and assuming that horses will be drafted into cavalry service in the proportion that they have been used in Europe there will be increased need for farm tractors.

Indirect Aid of Value

The officials of these engine manufacturing concerns believe this indirect assistance will be of the greatest value, though both are ready to direct their output wherever the Government advises.

The Chicago Pneumatic Tool Co. can furnish 1-, 1½- and 2-ton trucks on very short notice. This company has been making munitions for more than a year.

Several factories that desire to have their names withheld are among strong German communities, and in these stringent measures are being taken to guard against tampering. One of the larger factories has installed a lighting system on the outside of the factory, strengthened its force of watchmen and organized a detective bureau from its employees.

The Four Wheel Drive Co. is building thirty-seven trucks a week for the Government and is arranging to increase the output to meet probable increased Government demands. The concern has promised to produce 200 trucks a month for the Government if necessary.

The Wisconsin Motor Mfg. Co. is furnishing many engines for trucks to truck builders who are working on Government orders. Aviation engines are being turned out, and the production can be increased to one a day on demand. It is understood unofficially that the Standard Oil Co. of Indiana and other refiners are accumulating stocks of fuel at the Government's suggestion.

ARMY TRUCK SITUATION

Washington, April 6—Purchases of many motor trucks and, possibly, passenger cars will be made by the War Department as soon as it can get information as to extent of the army now in process of being built under the call of the President for an army of at least 1,000,000 men. The quartermasters' corps, the purchasing body of the War Department, plans to equip the various divisions by divisions as rapidly as they are obtained and mobilized. Details as to such purchases have been worked out, and while no actual contracts have been let, the matter of the purchases is in such shape that the contracts can be pushed through rapidly.

The recent activity in Mexico and along

the Mexican border resulted in the building up of quite a motor truck equipment, and the army now has, according to Col. Chauncey M. Baker of the quartermasters corps, 2600. This number is sufficient to take care of the needs of the army now.

The Department not only knows what it will need but it is well informed as to the facilities for getting the motor equipment. It knows where to go and what may be expected of a certain factory. Discussing the purchases in prospect, Colonel Baker said that in view of the fact the United States manufactures six times as many truck and passenger cars as the rest of the world, this government has no doubt of its ability to get quickly and satisfactorily what it will need from time to time as the army is built up.

JOY AVIATION FIELD OFFERED

Detroit, April 6—Joy field, owned by Henry B. Joy, has been offered to the U. S. Government for aviation training through Sidney D. Waldon, president of the Packard company. The field was inspected in 1915 by U. S. aviation officers, and a favorable report was made. The Packard company has been testing its aircraft engines there.

Fifty aviators could be trained there each nine months. Several of the racing drivers who have enlisted in the aviation corps as a squadron want to train on it. The equipment of the field is being considered by Mr. Joy, Gregory Flynn, representative of the drivers, J. D. Vincent, Packard vice-president, and W. B. Stout, Packard aircraft engineer.

FISHER OFFERS AIRPLANES

Indianapolis, Ind., April 6—The offer of Carl G. Fisher to give the army aviation department the use of the Indianapolis speedway as a training camp for aviators has been enlarged by his more recent offer of airplanes to the department. He calls attention in his telegram offering the airplanes to the hundreds of motor car testers in Indianapolis who would make the best possible material for aviators in time of war. The aviation department is anxious to accept the offer but has postponed acceptance pending action by Congress on a bill to provide funds for the establishing of aviation training camps.

TRAILER FOR AMBULANCE CORPS

Kansas City, Mo., April 6—While few purchases of motor equipment have been made for the national guard, many dealers are watching the situation closely, ready to supply equipment or to assemble the trucks or cars of customers with which they keep in close touch. There seems an especial interest in trailers and truck attachments, and it is quite likely that many will be bought by individuals or subscription for the various companies or corps. One organization has already bought a trailer and presented it to the ambulance corps.

Trucks Ready for War

Michigan Makers Can Produce Between 200 and 300 Daily with Present Capacity

Government Has Statement Showing What Can Be Done

DETROIT, April 7—The combined capacity of all Michigan companies engaged in the manufacture of trucks now is between 200 and 300 trucks daily, and these factories are holding themselves in readiness for war operations, which probably would raise this total in a short time. There are about 1000 trucks immediately available.

General Motors has 260 trucks on hand held up by the freight situation, and is producing twenty daily. Republic turns out seventy-five daily, and is working 20 hour shifts. It has 300 trucks stored in Detroit, and 2000 among dealers. Commerce is making fifteen trucks daily, and has a large stock of materials, though no trucks, on hand. It belongs to the National Security League, and is ready to turn over the entire plant and material to the government at once.

Packard is making twenty-five trucks daily, and has none on hand unsold. It could turn over several hundred, though, if needed. Signal has thirty trucks on hand, and is making four daily. The Acason Truck Co. is making three a day. Federal is making fifteen a day. It and Packard are engaged in work of a secret nature now. Packard will concentrate on airplane engines, following tests next week. Denby is making twenty daily, and has 100 on hand.

All makers have made statements to the government, telling what they can do, and lists of the trained drivers in the different factories already are in the hands of the War Department.

TRUCK STANDARD AGREED ON

Washington, April 6—A standard for motor trucks for army purposes has been agreed upon between representatives of the Quartermasters Corps of the Army and representatives of the Society of Automobile Engineers and is now before Secretary of War Baker for his approval. The approval of the Secretary is expected as soon as he reaches it on his desk. The standardization of motor trucks is taken up each year by the War Department, due not only to changes which are constantly being made in the design and manufacture of trucks but also to the special needs of the army as developed by experiences in the actual use of the trucks.

The standard just approved and sent to Secretary Baker will apply to the present year. Whether the war in which the

United States has entered lasts beyond this year or not, a new standard will be adopted for 1918. In seeking a standard for the army truck, the National Automobile Chamber of Commerce and the A.A.A. co-operated with the government's officers and the S.A.E. From the latter organization, Coker Clarkson headed a committee which met here last Friday to take up the question of standardization.

Several points were at issue between the manufacturers and the joint committee working directly on behalf of the government in a decision on the question of standardization, but these finally were worked out satisfactorily to all interested. As soon as the new standard is reviewed by Secretary Baker it can be used by manufacturers in the construction of trucks which may be begun in anticipation of the heavy demands of the government a little later.

350 RACERS SIGN UP

New York, April 9—The list of racing drivers who have signed up for governmental work during the war has been increased to 350. These are about even in their selection of the two departments, the aviation and the armored car division.

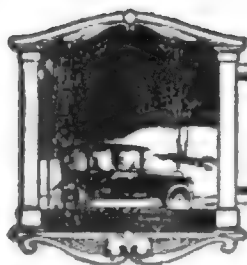
CUT PRICE HELD LEGAL

New York, April 10—The right of a retail merchant to sell a patent article at cut price was held legal yesterday by the Supreme Court of the United States. A dealer may now sell patented articles at any price he sees fit. The Supreme Court also held that a patentee cannot dictate what shall be used in his machines. That is, patent grants for machines give others the right now to use these machines subject to the patent right with any appropriate material or supplies.

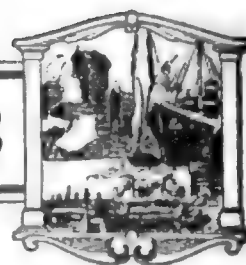
N. A. C. C. TAKES SCHOOL

New York, April 6—So that more and better draftsmen can be supplied to the makers of motor car bodies the National Automobile Chamber of Commerce has taken the Technical School for Automobile Draftsmen and Mechanics in charge and has broadened its own scope. The school has been conducted for thirty-seven years in this city. Graduates are connected with practically all the prominent motor car and body-building plants in the country.

Charles Clifton, president of the Pierce-Arrow Motor Car Co.; H. H. Rice, treasurer of the General Motors Co.; and Alfred Reeves, general manager of the N.A.C.C., have been added to the committee in charge of the school, of which Daniel T. Wilson is chairman. The committee plans to double the size of the school during the next year by additional equipment and by the larger quarters offered by the Mechanics Institute.



EDITORIAL PERSPECTIVES



Uncle Sam, Can't You Use Us?

IS there no place for the motorist and his car in the general scheme of America's defense? Our country possesses what would seem to a layman's eye to be a most valuable ally to its naval and army program of operations in the 3,000,000 motorists who stand ready, almost to a man, to offer themselves and their cars for any use in which they may be effective in this national crisis.

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TODAY'S news that a motor transport reserve committee has just been appointed by the Council of National Defense with the leaders of the motor organizations at its head to arrange for utilization of trucks and cars will be welcomed by motorists, for it seems there should be some niche in which motorists as a whole, and as motorists, could be utilized. True enough, wherever the opportunity is offered, the motorist has come forward with his car gladly and in the very restricted service that has been permitted him, he has proved valuable.

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EVERY city of any size within the last two weeks saw car after car carrying recruiting officers and banners—and, frequently, some fair enthusiast with a megaphone in the endeavor to build up in a day an army and a navy that should have been in the process of formation years ago. True, also, that motorists have been the chief means of distribution of the patriotic slides that appeared in all of our motion-picture theatres within the last few days. But all of these efforts have been haphazard and spasmodic; they have lacked organization.

The motoring organizations of the country and of the different cities have informed themselves as to the availability of their members and their members' cars, but any assistance they have been able to give so far has been chiefly in recruiting.

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THAT the motorist on the street responded gladly to any suggestion as to how he may help was most most forcefully brought out last Saturday when one of the patriotic organizations in Chicago sent a hurry call to the different motoring clubs of the city asking for cars for the distribution of recruiting slides to the moving picture houses in the city. Not only did the club members respond in force, but they sent men out on the boulevards to hail motorists as they drove to their business. Nearly every motorist who was stopped on the boulevard, without reference to club affiliations, gave up his afternoon plans and reported at headquarters for orders. Similar object lessons in the motorists' patriotism are given in every city.

✻ ✻

IN New York City motor truck owners in particular assisted greatly in the mobilization of the militia and national guard, carrying troops and their impedimenta to some indefinite point "somewhere in New York." Motorists of several of the states and cities have organized so far as possible under the existing regulations of their separate states. These ordinarily take the form of a motor reserve corps.

Motor Reserve Corps

OWNERS of motor cars in New York state, in California and in Illinois have attempted to organize themselves in the last two years in some way to be of assistance, if not in actual warfare, in transportation of troops and supplies. Only in California has this movement reached any degree of success—simply and solely because of the states mentioned California is the only one in which any provision has been made for co-ordinating the civilian motorist with the work of the military forces.

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IN California, the success of the motor reserve corps has been pronounced and should serve as a model to civilian organizations of the sort in other states. Indiana now through

the Hoosier State Automobile Association is organizing a volunteer corps to act as an unofficial though recognized auxiliary of the Indiana National Guard. In very few states, however, is there legislation which permits of such co-operation in any official or semi-official way.

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WITH the exception of the Marine Corps, there is no arm of the Federal service, so far as it has been able to determine at this time, that has any arrangement by which motorists may learn how to be of service as motorists. There is no way in which they may co-ordinate in a body with the military or naval authorities.

NEXT WEEK

"Without gasoline it would be impossible to carry on the war on a fraction of its present scale; yet there are sections of the front which have remained, and probably always will remain, closed to gasoline vehicles. Half a dozen of us, with an hour's time to kill in an advanced post, tried to imagine the war in Italy without the gasoline engine. We reduced it to an affair of outposts occupied by a few hundred men—then gave it up as impossible."

Thus writes W. F. Bradley in his story on "How Motors Help the Army," which will be published in MOTOR AGE next week. Mr. Bradley was in the Italian ambulance service on the Italian-Austrian front four months. In this time he had the best of opportunities to study firsthand the use of cars and trucks by the Italian army.

Air Motors from Willys

Overland Accepts Contract from Curtiss to Make 4500 Aviation Engines

Order Will Not Affect the Regular Production of Concern

TOLEDO, Ohio, April 10—Special telegram—The Willys-Overland Co. has accepted a contract from the Curtiss Aeroplane Co. to manufacture 4500 Curtiss airplane engines for the United States Government. These engines will be made at Elyria, Toledo and Elmira. Work is already under way for the manufacture of the special tools necessary to fulfill this contract. This airplane manufacturing in no way will hinder or reduce the regular produce of the Overland.

PACKARD STARTS DELIVERY

Detroit, Mich., April 10—The Packard Motor Car Co. already is making delivery of trucks to the government, but this fact is not hampering the manufacturing of trucks for the consumers.

TO HELP DIRECT ADVERTISING

Detroit, Mich., April 10—Harry W. Ford, president of the Saxon Motor Car Corp., has been appointed a member of the National Advertising Advisory Board which will have charge of government advertising during the war.

STUTZ MAKES WAR GIFT

Indianapolis, Ind., April 9—Harry C. Stutz, president of the Stutz Motor Car Co., today donated to the Indiana National Guard its first motor equipment. In behalf of the company he gave the state's military organization six Stutz chassis constructed specially for ambulance purposes. The Parry Mfg. Co., this city, has agreed to build the bodies, the total gift to the state being valued at about \$15,000. Mr. Stutz not only offered the chassis, but has promised to assist in recruiting thirty first-aid men to accompany the cars. Men in the Stutz factory already have agreed to join a company to become drivers of the cars and enough additional men have agreed to enlist to complete a company.

HOOSIERS START MOTOR RESERVE

Indianapolis, Ind., April 9—The Hoosier Motor Club of this city, desiring to place its membership in the services of the country, today announced a plan for organizing the motorists of Indiana into a motor reserve to be an auxiliary to the Indiana National Guard. The plan has been authorized and sanctioned by Adj. Gen. Harry B. Smith of the Indiana National Guard. It is the purpose of the club to have motorists enroll so that in an emergency it would be unnecessary to wait for rail transportation in moving the national

guard. An appeal to motorists is being made on the grounds that motor transportation would be most valuable in case of such danger as might arise through invasion of the South. Motor reserves have been organized in New York and California, after which the Indiana organization will be patterned. The only requirement for membership is that the motorist sign the enrollment blank, agreeing to obey orders in times of emergency.

U. S. TRUCK SHOWS LOYALTY

Detroit, April 9—Headed by officials of the company and escorted by a body of state militia, officially designated more than 500 men and women, employees of the United States Motor Truck Co. of Cincinnati, held a patriotic parade in Covington, Ky., where the factory is located, April 7, immediately after word was received that President Wilson had signed the declaration of war.

The parade was witnessed by thousands of Cincinnati and Covington citizens and was more than three city blocks in length.

ARMORED CAR AS GIFT

Baltimore, Md., April 6—The King Motor Sales Co., Inc., this city, has headed a public subscription list to purchase a light armored motor car for presentation to the Maryland militia. The car to be presented is manufactured by the King Motor Car Co. and the Armored Motor Car Co. of the same city. The latter concern recently filled an order for five of these light armored cars for the United States Navy.

The armored car is mounted on the standard King eight-cylinder chassis and is armed with defensive armor and a machine gun mounted in a revolving turret. The gun may be either a Lewis, Vickers or Benet rapid fire gun. Each car carries three men,—a driver, gunner, and mechanic, the latter acting either as assistant to the driver or gunner.

MOTT MOVING TO JACKSON

Jackson, Mich., April 7—Within sixty days the Mott Wheel Works, now in Utica, N. Y., will be in operation at Jackson, Mich. This will bring the Perlman part of the Mott Wheel Works to Jackson, also, and that will be added to the Perlman Rim Co. plant in that city. The balance of the \$80,000 needed to bring the Mott plant to Jackson was raised early this month. It is reported that arrangements practically have been completed through the courtesy of the Briscoe Motor Corp., by which that company will surrender the former Ames-Dean plant on Wildwood avenue to the new corporation.

MEXICO MARCH IMPORTS 775

Washington, D. C., April 6—Seven hundred and seventy-five motor cars were imported into Mexico during March as a result of the act of the de facto government removing import duties from all classes of motor vehicles.

Coffin May Get Portfolio

Washington Rumors Make Him Secretary of Munitions in War Cabinet

Work for Preparedness Adequate Qualification for Position

WASHINGTON, D. C., April 6—Howard E. Coffin has done more than any other man in the motor car industry in the work of preparedness, and rumors around the capital are that he undoubtedly will be appointed Secretary of Munitions in President Wilson's war cabinet when such a portfolio is created. Besides giving his time practically exclusively to this preparedness work Mr. Coffin has spent large personal sums on the work.

Most of last year he maintained offices in New York, where he directed the work of compiling an industrial index of 30,000 manufacturers. A sixteen-page questionnaire was sent to these 30,000 manufacturers, who were scattered through every state in the Union. More than 27,000 replied, and all the information has been segregated in a card index which makes the information instantly available. The complete machine equipment of all factories of any and all kinds, as well as other valuable information, has been compiled in this way.

The information makes it possible to find out in a few minutes how much ammunition of a certain size could be made in all the factories in Connecticut, in Illinois, in Michigan and in every other state.

Mr. Coffin has kept in close touch with the makers and distributors of munitions in Europe and is adequately qualified to assume such a portfolio.

CAMP FOR AVIATORS

New York, April 6—A large training camp for aviators is to be established on Long Island near this city by H. P. Davison of J. P. Morgan & Co., who will equip a plant to train 100 men.

NEW ENGLAND VOLUNTEERS

Boston, Mass., April 7—New England motorists have responded to the call for aid very well so far. Some weeks ago Massachusetts organized a Safety First Committee, and Chester I. Campbell, secretary of the Boston Automobile Dealers' association, was placed in charge of trucks and cars. He sent out a call for machines and received many replies. Then the Bay State A. A. held its banquet and passed around slips asking for cars or trucks from the members, and many volunteered. These were sent to the committee and turned over to Mr. Campbell. The Springfield A. C. did the same. About 2500 cars and trucks have been volunteered. These are being tabulated so that duplicates can be eliminated.

Industry Is About Normal

War Not to Affect Factories Seriously, Is View of Motor Officials

A Few Are Considering Munitions, However

DETROIT, April 9—War and military preparations will not affect the normal status of the motor car industry seriously. This is now the view held by the higher officials of the motor world. The smoke of early rumors and snap conjectures is clearing, and the future, as based on the substantial knowledge of authoritative circles, seems to be less chaotic than first predictions conveyed.

It is pointed out that practically every munitions and other factory which had been engaged in operations for the Allied armies has completed its contracts and is now able to commence work for this government at full capacity. In fact, offers are now coming from Canadian plants who are no longer needed by the Allied armies, and who stand ready to make rifles and other military necessities for the United States. The greatest needs of the Allied nations seem to be food and raw materials, and these, of course, are not connected to an important extent with the motor car industry.

Consequently, it would seem that the majority of the motor car factories will be permitted to continue their normal business, while a few which have already been in communication with the government will manufacture airplane engines and trucks.

Munitions Now On Modest Scale

It is also reported that several of the larger parts makers will devote a part of their factories to the manufacture of munitions and that in a few instances the plants are engaged already in a modest scale in this work. The plan seems to be to take a few of the employees at a time and instruct them in the work and then shift them to the regular employment while others learn the munitions routine. In this way but a few machines are used and the entire force becomes competent and available if future events demand it.

Minor activities continue. The Goodyear Tire & Rubber Co., Akron, Ohio, has added military training to its educational classes, and instruction is given by a former army officer. Workers receive 2 hr. of drill each week.

Lieutenant J. L. Backus of the Thirty-first Michigan regiment is organizing an all-soldier-manned motor truck company and is preparing to drill and train the men with trucks for actual service on short notice. The men will be enlisted as regular soldiers and serve as a part of the quartermaster's corps. As many companies will be organized as possible, and volunteers are

sought. Each train will consist of thirty-three regular chauffeurs and nine extra chauffeurs, three assistants, one chief mechanic and three assistant mechanics.

The Higrade Motors Co., Grand Rapids, Mich., is making a four-wheel drive heavy duty truck which will soon be tested by the government ordnance department. The truck is the invention of L. W. Coopock, and if found successful by the government, the Higrade company will take it over with the patent rights and will manufacture it for government purposes.

The Reo Motor Car Co. has formed the Reo Rifle Club which in turn is organizing an infantry company for war purposes.

MANUFACTURING ADEQUATE

Washington, D. C., April 9—Howard E. Coffin, member of the advisory commission of the council of national defense, discussing the work being done by the motor transport committee and the motor trucks standards conference committee to the end of co-ordination of the motor car resources of the country for emergency purposes and quickening of the development of standardization of motor vehicles for such needs, said that with a proper organization of the vast agency of motor transportation a definite service to the nation will result.

Mr. Coffin said that as America now has in active service 2,500,000 motor cars as against 800,000 in use in all the rest of the world put together and that as our present producing capacity is about 1,250,000 cars a year, any emergency call by the military authorities in any district will, due to the months of work of the committees, be met promptly.

DIXIE OVERLAND HIGHWAY

Columbus, Ga., April 9—The Dixie Overland Highway Association has been incorporated to foster the construction of a highway, to be known as the Dixie Overland highway, from Savannah, Ga., to Los Angeles, Cal., to strive for uniform traffic regulations in the eight states through which it will run and otherwise work for a year-'round highway. The highway has been organized three years. The officers are Honorary president, Frank G. Lumpkin, Columbus, Ga.; president, John S. Blecker, Columbus, Ga.; vice-president-at-large, Harvey Granger, Savannah, Ga.; secretary-treasurer, Leland J. Henderson, Columbus, Ga. The Dixie highway also has Savannah as one terminus.

CINCINNATI GETS MAY 30

New York, April 7 — The Cincinnati speedway has been awarded the May 30 date for a race. Both the Chicago and Cincinnati speedways were after the date given up by Indianapolis when it withdrew from all racing activities in 1917 on account of the war.

Will Mobilize Motors

New Committee to Organize Trucks and Cars for Emergency Needs

Layout of Suitable Highways Will Be Undertaken

NEW YORK, April 10—Special telegram—The mobilization of motor trucks and motor cars for army transportation work has taken definite shape by the appointment of the Motor Transport Reserve Committee by the Council of National Defense, at Washington. Alfred Reeves, general manager of the National Automobile Chamber of Commerce, is chairman of the committee and associated with him are three other men prominent in the industry, Roderick Stephens, president of the Motor Truck Club of America, who is in the coal business in New York; Coker F. Clarkson, general manager of the Society of Automobile Engineers; and A. G. Batchelder, chairman of the executive committee of the American Automobile Association.

This motor transport reserve committee met in Washington, D. C., last week, with Secretary of War Baker and Colonel Baker, who is head of the transportation department of the U. S. Army. As a result of this conference, a rather clear outline of the work of the committee was arranged. A committee is preparing a definite plan for the mobilization of motor trucks and motor cars for emergency needs in any part of the country. It is also preparing a definite plan for organization of available drivers and mechanics needed for such a mobilization. The necessary layout of suitable highways for transportation purposes comes under the work of the committee. It is expected that within ten days good progress will be made and another meeting of the committee held in Washington. The N. A. C. C. took the initiative in this work by volunteering not only to do the work but to share the expense of it as well.

Complete Census Expected

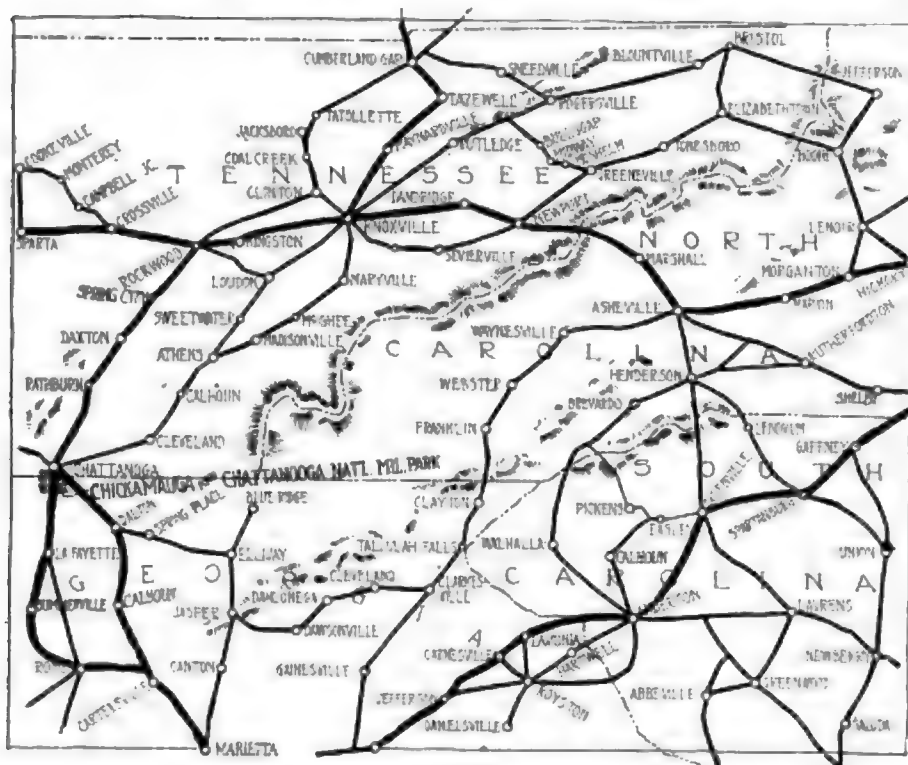
It is expected that a complete census of motor trucks through the country will be made. The committee plans to schedule all available truck fleets of private owners on a basis that perhaps 10 per cent of the trucks should be held available for call on 2 hr. notice; that 20 per cent should be held available for call on one day, or perhaps two days, notice, etc. In this way the committee hopes to know exactly what trucks can be counted upon for emergency needs in any section of the country.

STEWART-WARNER FOUNDRY

Chicago, April 9—To overcome the delay caused by the dependence of one factory on another in the industry the Stewart-

In the Shadow of Old Lookout

Famous Peak Commands View of Seven States



Map roads in district contiguous to Lookout Mountain that stands sentinel over Chattanooga, Tennessee

DOWN at the southern end of the eastern mountain range is found Chickamauga and Chattanooga National Park, embracing over 15 sq. mi. These battlefields are marked with monuments commemorating the struggles fought there between the North and South. Scarcely a sentence is needed to justify the selection of what may rightly be termed the historical section of the United States as an objective for those tourists who enjoy digging into the musty archives of early life in our country. The trail of romance and legend, of peace and warfare, leads one down the Shenandoah valley and along the backbone of the Atlantic states formed by the Allegheny and Blue Ridge mountains, affording an opportunity to study epochal periods of American history from all their pristine sources.

Indian Paths Now Roads

The paths across the Blue Ridge and Allegheny mountains were first made by the Indians, but the white man's government has since made roads which traverse a good part of this historical section.

Lookout mountain, Tennessee's great historic resort, offers the tourist unsurpassed opportunities for the enjoyment of some of the finest scenery America can produce. Rising 2300 ft. above sea level and 1700 ft. above the city of Chattanooga at its base, the view from its lofty summit

is one of exceptional grandeur and extent, embracing a view of seven states—Tennessee, Kentucky, Virginia, North Carolina, South Carolina, Georgia and Alabama. The faint blue outline of the Cumberland mountains lie to the northwest; between them and Lookout stretch the lower peaks of the Sand and Raccoon mountains. Walden's Ridge, Cameron Hill and Sherman Heights continue the line to the east where Missionary Ridge, backed by the Great Smokies, unite to form the eastern circumference of the vast semi-circle revealed from this spot. In the foreground wind the silvery waters of the Tennessee river, the picturesque convolutions of which describe a remarkable curve, known as Moccasin Bend.

Missionary Ridge, and Sherman Heights, Cameron Hill and Lookout itself stand as perpetual monuments to those who fell near by, and Chickamauga in the valley beyond arouses the memory of stirring scenes enacted over a half century ago. Lookout mountain extends over the border line into Georgia, and along its rugged sides are observation points, from which one gets remarkable views. Among the principal attractions are Sunset Rock, Rock City, the Natural Bridge, Telephone Rock, Lulah Lake and Falls, the Leonora Spring, and each visit to these and the many other natural curiosities on the sum-

mit is a fresh revelation to the tourist, who would find it impossible to exhaust the resources of the mountain in an entire season.

Besides being the great theater of the Civil War, this section has many other claims to distinction. A library might be written about this part of our country, which extends along the Appalachian range—stories in which interest would never lag. Take for example, a little stretch of country between Staunton and Richmond, Va. It is said that the country around Charlottesville, within a radius of 20 miles has produced more presidents, statesmen, jurists, foreign diplomats and others of note than any similar section of the United States.

Birthplace of President Wilson

Staunton can boast of being the birthplace of President Wilson, who was born in 1856 at the "Manse" on the southwest corner of Frederick and Coulter streets. Proceeding down toward Richmond, one comes to Rick Fish Gap, which is the famous point where the early settlers saw and laid claim to the Shenandoah Valley in the name of the king of England. This gap was much used by Federal and Confederate soldiers.

Charlottesville, situated on the road to Richmond, was the capital of the state in 1782. Among the foothills of the Blue Ridge lies the University of Virginia, founded in 1819 by Thomas Jefferson, who devoted himself to its welfare. It was the child of his old age when he lived at Monticello. President Monroe also lived at Charlottesville, his residence being Monroe Hill and his farm, Ash Lawn. Benjamin Franklin once owned an estate there and the birthplaces of Lewis and Clarke, the great explorers, are nearby.

North Carolina mountain sections are as replete with interesting historical associations as are the Virginias. Leaving Winston-Salem and going 30 miles south brings the tourist to Guilford Battle Grounds in Greensboro. Fifty miles farther is Salisbury, the site of a Confederate prison in which 1200 soldiers died while in captivity, being buried in the National Cemetery close by. The city was once noted as a gold mining town, the old gold mine having produced \$20,000,000 in bullion.

We announced last week that during the touring season we would continue to publish information of the same character as appeared in the Touring Issue, that is, give supplementary tours for week-end or holidays. In keeping with this announcement, we give herewith additional tours as shown on the map on this page, tours that may be linked for a longer tour if desired. Next week we shall take up another sec-

tion of our country and give additional information on short tours originating from the principal cities in that section that could not be given in their entirety in the April 5 issue.

Chattanooga, Tenn.

1—To Knoxville and return, 250 miles. It is optional with the tourist which way he goes on this trip, since there are two or three routes. One is to follow the Dixie highway north and east through Rathbun, Dayton, Spring City and Rockwood, then east through Kingston to Knoxville. Two roads lead south from Knoxville as far as Athens, one via Maryville, McGhee and Madisonville and the other via Loudon and Sweetwater. These two roads converge at Athens and the route into Chattanooga is by way of Calhoun and Cleveland.

2—A somewhat shorter tour than that outlined in No. 1, and which may be made in one day, is a circle drive south over the Dixie highway by way of Lafayette and Summerville to Rome, Ga., thence east to Cartersville and return over the eastern Dixie highway through Calhoun and Dalton. If one wishes to extend this trip into two days, instead of turning back at Cartersville, continue south through Marietta and thence to Atlanta. Returning, retrace your way to Marietta from Atlanta and then drive north through Canton, Jasper and Ellijay and then west through Spring Place to Dalton and Chattanooga.

3—Chattanooga has much to interest the motorist in the territory immediately surrounding the city. Here one finds historic spots and scenery that will keep interest aroused for days and no one should overlook the important things to be seen close at hand in order to take long tours out of the city.

Knoxville, Tenn.

Knoxville, situated in eastern Tennessee, is the hub of a very complete system of pikes and offers a number of interesting short trips of scenic and historic moment. The city is the junction point for the Dixie and Southern National highways.

1—A circle tour of 300 miles, which may be cut in half if the tourist desires, takes one northeast through Rutledge, Rogersville and Blountsville to Bristol, thence south to Elizabethtown and returning southwest through Jonesboro, Greenville and Newport, where there is an option of driving into Knoxville via the Southern National highway through Dandridge or keeping to the south and driving through Sevierville to Knoxville. This 300-mile trip may be cut in half by cutting across from a point a little beyond Rutledge and going through Bullgap, Midway and Musheim to Greenville where the return route mentioned joins with the cut off.

2—A good one-day trip of 125 miles out of Knoxville takes one via Clinton to Rockwood and return by way of Kingston. There is a possibility offered of cutting across to Kingston a short distance east of Rockwood, which shortens the trip to about 100 miles.

3—A circle tour of 150 miles takes one north through Maynardville and Tazewell to Cumberland Gap, following the Dixie highway, and return by LaFollette, Jacksboro, Coal Creek and Clinton. From LaFollette a side trip may be made to Jellico, 20 miles.

Asheville, N. C.

Asheville, the metropolis of western North Carolina, is one of the most famous mountain resorts in America. The city, often called the "Queen of the Mountain Tops," is the social and commercial center of "the Land of the Sky." Here the Swannanoa and historic French Broad

rivers join in the very center of a vast plateau 250 miles long and 50 miles wide. Within two miles of Asheville is Biltmore, property of the late George W. Vanderbilt. This is a densely forested tract containing nearly every kind of tree to be found in the mountainous region of eastern United States. Through the vast grounds of this estate are motor roads of the finest type. Last year the country around Asheville was visited by one of the most disastrous floods ever known in that section and practically all of the roads were more or less damaged. Rapid strides in repair work have been made, but it is best to make inquiry before attempting side trips out of Asheville.

1—To Mount Mitchell—This is an 18-mile trip and at the summit of Mount Mitchell one reaches an altitude of 6711 ft., the highest point in eastern North America. Two days should be allowed for this trip. There is no motor road to the summit, but it can be made on foot or muleback. Guides and mules can be obtained at reasonable rates.

2—To Pisgah Mountain—Twenty-six miles from Asheville is Pisgah Mountain, which rises 5749 ft. above sea level. There is also an exclusive motor road to Sunset mountain to the northwest of Asheville. From either of these two mountains a wonderful panorama is unfolded to the visitor.

3—To Knoxville, Tenn.—This is a drive of 130 miles through Marshall, N. C., Newport and Dandridge, Tenn. Marshall is a unique city in that it is one mile long, one street wide and sky high. It is on the banks of the French Broad river and hemmed in by mountains on either side. This trip takes one across the Great Smoky mountains into Tennessee which offer superb scenery.

4—A 150-mile triangle trip takes one to Spartanburg, S. C., via Hendersonville and Lenoir, then to Greenville, S. C., and return

to Hendersonville. Greenville is a college town and also a manufacturing center. One of the first National highways was projected by Hon. Joel R. Poinsett, secretary of war under Fillmore. This road, passing across the mountains in the vicinity of Greenville at Saluda gap is still used and its massive stone bridges attest Poinsett's skill as an engineer. There are a number of interesting side trips at Greenville, among them being Caesar's Head, about 20 miles distant, which has scenic features of more than usual attractiveness.

5—To Atlanta—This road goes to the West of the mountains through Waynesville, Webster, Franklin, Clayton, Ga., and Talula Falls to Clarksville, where there is an option of going west to Jasper, via Cleveland, Dahlonega and Dawsonville, and thence south from Jasper through Clayton and Marietta to Atlanta, or by keeping straight south from Clarksville through Gainesville and striking the Southern National highway a short distance to the east of Marietta and then into Atlanta.

6—This is a beautiful mountain trip from Asheville to Anderson, S. C., passing through Brevard and Walhalla. This road is rough in places but offers some very interesting scenery.

Anderson, S. C.

Anderson, S. C., is on the Southern National highway and there are a number of short week-end tours that may be made with this city as the starting point.

1—This takes one directly east through Laurens to Newberry, thence north through Union to Spartanburg, where the Southern National highway is touched, thence west to Greenville and south to Anderson.

2—This takes in a part of tour No. 1, that is, that part as far east as Newberry, thence south to Saluda and return through Greenwood to Anderson. There are several cut-offs on this tour, any one of which may be taken to lengthen or shorten the total distance.

3—West from Anderson one can follow the Southern National highway to Atlanta, Ga., making side trips to Royston from Lenoir, Carverville or Jefferson.

Routes and Touring Information

Selma, Ohio—Yellowstone Park—California—Grand Canyon

SELMA, Ohio—Editor Motor Age—Kindly give route through Columbus Junction, Iowa, Yellowstone Park, Caldwell, Idaho, and Silver City, Idaho, Portland, Ore., south through California to San Diego and the Grand Canyon.—F. M. Wilson.

From Selma, Ohio, proceed to South Charleston, Springfield, Urbana, Bellfontaine, Kenton, Dunkirk, Findlay, Lima, Delphos, Van Wert, O. New Haven, Ind., Fort Wayne, Chubbuck, Noblesville, Ligonier, South Bend, New Carlisle, Michigan City, East Gary, Miller, Aetna Station, Gary, Calumet, East Chicago, Hammond, Ind., South Chicago, Ill., Chicago, Lombard, North Glen Ellyn, West Chicago, Geneva, DeKalb, Creston, Rochelle, Ashton, Dixon, Sterling, Unionville, Morrison, Unionville, Garden Plain, Albany, Cordova, Port Byron, Watertown, E. Moline, Moline, Davenport, Ia., Blue Grass, Muscatine, Fredonia, Columbus Junction, Columbus City, Washington, Harper, Springfield, Okaloosa, Pella, Prairie City, Des Moines, Adel, Redfield, Dale City, Monticello, Guthrie Center, Exira, Walnut, Avoca, Minden, Underwood, Weston, Council Bluffs, Omaha, Neb., Elkhorn, Waterloo, Valley, Fremont, Ames, North Bend, Schuyler, Richland, Columbus, Duncan, Central City, Grand Island, Wood River, Shelton, Glibson, Kearney, Odessa, Elm Creek, Lexington, Gothenburg, North Platte, Sutherland, Paxton, Ogallala, Brule, Big Springs, Chappell, Lodgepole, Sunol, Sidney, Potter, Dix, Kimball, Bush-

nell, Pinebluff, Wyo., Egbert, Burns, Cheyenne, Chugwater, Wheatland, Uva, Glendo, McKinley, Orin Junction, Douglas, Glenrock, Casper, Johnson's Ranch, Powder River, Hell's Half Acre, Waltman, Arinto, Los Cabin, Reid's Ranch, Thermopolis, Worland, Manderson, Basin, Cody, thence into Yellowstone Park and out at Yellowstone Station. Proceed to Flat Rock Bridge, Osborn Bridge, Ashton, St. Anthony, Sugar City, Rexburg, Rigby, Idaho Falls, Arco, Martin P. O., Carey, Gunnett, Bellevue, Halley, Soldier, Old Corral, Dixie, Mountain Home, Boise, Caldwell, thence directly south to Silver City. Back to Caldwell, New Plymouth, Fruitland, Payette, Weiser, Huntington, Ore., Baker City, Haines, North Powder, LaGrande, Mencham, Emigrant Springs, Pendleton, Heppner, The Dalles, Portland; thence south over the Pacific Highway through Salem, Eugene, Roseburg, Medford, Ashland, Yreka, Cal., Dunsmuir, Redding, Anderson, Red Bluff, Marysville, Wheatland, Roseville, Sacramento, taking the Pike's Peak Highway into San Francisco. Proceed to Santa Clara, San Jose, Gilroy, San Juan, Salinas, Soledad, King City, San Lucas, Bradley, San Miguel, Paso Robles, San Luis Obispo, Santa Maria, Los Olivos, Ventura, Los Angeles, Santa Ana, Oceanside, San Diego, La Mesa, Camp, El Centro, Holtville, Knobb Siding, Yuma, Ariz., Dome, Antelope Hill, Norton's Ranch, Palomas, Aqua Caliente, Arlington, Palo Verde, Phoenix, Hot Springs Junction, Tub Springs, Wickenburg, Congress Junction, Date Creek, Hillsdale, Kirkland, Skull Valley, Prescott, Jerome Junction, Del Rio Station, Ash Fork, Williams,

Uniform Traffic Rules an Asset

Yellowstone Trail Will Profit from Standardization

OF twenty-five large cities, chosen at random, fourteen make one blast of the traffic officer's whistle indicate north and south traffic proceed and eleven make the same signal apply when east and west traffic is to proceed. In these same twenty-five cities the allowable speed in the business district varies from 8 to 16 miles an hour; five set the limit at 8, eleven at 10, three at 12, five at 15 and one at 16 miles an hour. In the residence districts of these twenty-five cities the speed limit range is from 12 to 25 miles an hour; three set it at 12, eleven at 15, three at 18, seven at 20 and one at 25. Headlight regulations in these same cities vary as much as speed and signals. Five have no regulation of lights at all, five require "reasonable" lights, one sets the extreme mark at which the concentrated beam of light shall strike the ground in front of the car at 75 ft., one at 150 ft., ten at 200 ft., and three at 300 ft.

Two of these phases of traffic regulation and possibly all three are fundamental principles that can and should be uniform. The average motorist today is quite as much perplexed with the variance of traffic regulations as he would be were he able to speak but one language and had to travel through fifteen or twenty towns a day in each of which a language different from his own was spoken. Surely the cross-country motorist needs an interpreter as his constant companion when touring if he hopes to obey the rules for governing his movements through municipalities, and even then he could not hope to be right more than half of the time.

Organized effort being superior to individual, the various cross-country highway associations might well make it a part of their work to bring about a revamping of different traffic regulations and putting every city on each through highway on a uniform basis. This is a question that should not be plunged into blindly; the highway associations should work together. A committee made up of two or three members of each highway association should be gotten together and a sane set

of rules, which, basically will apply to every city, town and village, adopted. Then there would be no likelihood of conflicting rules as between the different highways, once the work was under way.

Just now MOTOR AGE is concentrating its efforts toward bringing about standardization of traffic rules in every village, town and city on the Yellowstone trail west of Chicago. Here are approximately 250 cities linked together by approximately 2500 miles of highway, over which many touring parties pass every day in the touring season. It can be said without exaggeration that traffic regulation differences are almost as numerous as the cities themselves, therefore, the problem a motorist faces when he attempts to pass through ten or twenty towns a day is not conducive to his peace of mind.

It would be just as much of an asset, yes even a greater asset when viewed from some aspects, for every named highway to have uniform traffic rules in force the entire length, and by this we mean uniformity that not only applies to the cities on

that named road, but every other named road, as it would to have its entire surface paved.

Motorists and members of the Yellowstone Trail Association are thoroughly aroused to the necessity for standardizing the traffic laws along the entire trail length. We have told them what such a move would mean as an asset to the road as a whole, how it would attract tourists, how it would reduce accidents and make for greater peace of mind on the part of the motorist using the road. We have told them what fundamentals are applicable to every town, no matter what its population. We have told them how to go about stirring up interest and approaching officials who have the making of traffic rules in hand.

The response has been very gratifying. The need for uniform regulation has carried home and within the next few months we may expect the Yellowstone Trail to add to its present slogan: "A good road from Plymouth Rock to Puget Sound," that of "Uniform traffic regulations its entire length."

Traffic Signal Controversy Reopens

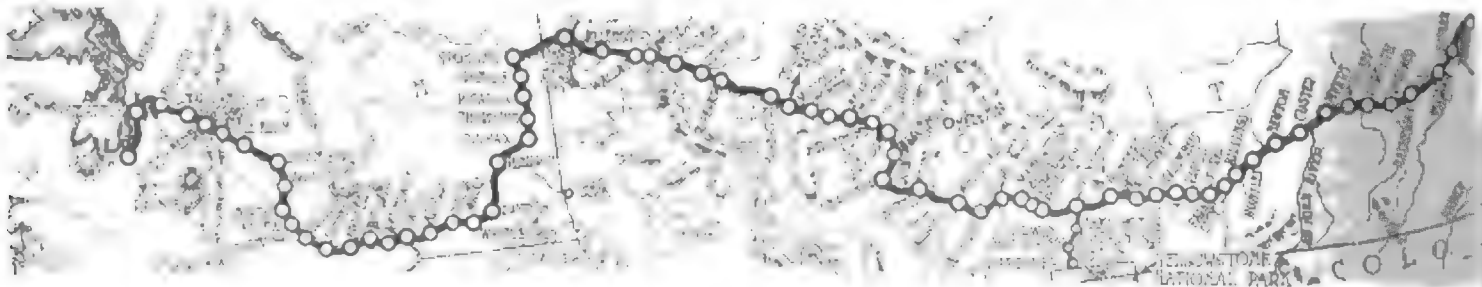
DENVER, Colo., March 21—Editor MOTOR AGE—The remarks and criticism of Max Cerf in MOTOR AGE of March 15 were read with interest and I must take exception to portions of his article, for from what he says, I am led to believe that he cannot be conversant with traffic ordinances in general, nor with the operation of motor cars from the driver's standpoint.

Mr. Cerf would put another signal on the front of a car for the pedestrians' benefit, for it certainly would not be of any service to other motorists. Anything in the way of a signal sufficiently large to attract the instant attention of a pedestrian will be a wind catcher, and will disfigure the symmetry of the car. The streamline body was developed to cut down wind pressure, as well as to give a racy appearance. The lamps have been made smaller, some of them put inside, the horns are now mostly

inside, and the marked tendency is to clean up the lines at the front of the car. A splint or wind puff on the leg of a driving horse was a blemish that could not be tolerated, because it was a wart on the smooth line or curve. Neither will a signal be tolerated that stands out on a front fender or hood like an excrescence.

Let us not lose sight of the fact that the Safety First Federation of America definitely located all traffic signals on the left rear fender, in order to have them visible from the rear and unobstructed by tires usually carried on the back of the car, also to have a uniform location adopted throughout the country. Then why hunt about for any other location?

It is all well enough to theorize on what the motorist should do, but when it comes to forcing him to install signals on the front as well as on the back of his car, he



This map shows the close proximity of towns on the Yellowstone trail west of Chicago but does not show much more than one-half of the towns, cities. Traffic rules have been a bugbear to Yellowstone trail tourists the same as to those traveling over other highways, and it is believed, judging from the month will see practically every municipality through which this 2500 miles of highway passes.

will surely balk, and with good reason. Bear in mind that two signals on each car will run up to between \$40,000,000 and \$50,000,000 before all cars are equipped, so before any drastic action is taken, requiring signals on all cars, let us get signals standardized, the cost down to a minimum, and the unnecessary eliminated.

We do not want to see an ordinance passed anywhere that will compel anyone to buy a traffic signal. When the motorist is convinced that a signal adds to his peace of mind and to the ease and comfort of driving, he will install the signal which to his mind best suits his conditions, and he will not need any forcing, furthermore he will not stand any.

I believe it was the sense of the last meeting of the Safety First Federation, that there had already been enough and too much legislation applying directly to the motorist and that further legislation should affect the pedestrian only. Many cities have made it unlawful to cross streets except at regular crossings, and then only in right angles, no corner cutting or jay walking allowed. The pedestrian has always had the right of way at crossings, but has allowed the motorist to encroach upon his rights, so that now it is considered necessary to mention in new ordinances that the pedestrian still has his rights.

Time Lost by Signal

In crossing a street on foot, one looks at the bulk of a car bearing down on him, and if a tiny signal has to be looked for, a valuable second is lost. Cities require a certain speed at crossings, and if a car is moving sufficiently slow to give a pedestrian time to observe a signal, it will be moving slow enough so that a slight hand movement or nod will be all that he needs or has time to notice.

The traffic officer and pedestrian may as well be eliminated from this discussion, because the traffic officer has control of the situation anyway, and does not have to be warned—the pedestrian has the right of way at crossings in practically all cities, and besides he cannot take time in dense traffic to ascertain in advance what each motorist has in mind. By the time he has settled it in his mind what one car is going to do, another car is presented for his inspection and he will be left standing at the curb till the roadway is clear.

The pedestrian who needs other warning than the sight of cramped wheels or obliqueness of car, to warn him that a car is turning, does not belong in the city, or should move to so large a city that he will find an officer at every crossing. If the

FURNISHES \$825,625 BOND

Cleveland, Ohio, April 9—The Peerless Motor Car Co. has filed a bond in the court of common pleas for \$825,625 to stay the execution of a verdict of \$412,812 recently awarded Henry S. Chapman in his suit for war truck commissions. The Peerless company has recently filed a request for the hearing.

MORE TIRE ADVANCES

New York, April 6—Further price increases among the tire companies are reported this week, the remaining companies revising their listings about 10 per cent as did those companies the previous week. Empire is 10 per cent higher through its whole list; Globe is 5 to 10 per cent higher; Leo is higher; and Miller has gone up 10 to 12 per cent. Pennsylvania Rubber expects to announce an increase soon.

DODGE-FORD SUIT POSTPONED

Detroit, April 9—Hearing of the Dodge-Ford suit, previously set for Monday, April 9, will not be held until "as soon as possible after May 1." The postponement is the result of an informal agreement by attorneys on both sides. This suit was brought originally Nov. 1, 1916, by John F. and Horace E. Dodge, when they complained that Henry Ford had no right to withhold from the stockholders of the Ford Motor Co. some \$50,000,000 in dividends for the purpose of reinvesting the money in duplicating the plant at Highland Park and building a smelter on River Rouge to make iron by a new process. As the case now stands, Henry Ford is free to carry out his plans of expanding the Ford company, his right to build a smelter plant having been obtained by his furnishing a \$10,000,000 bond Jan. 6 to indemnify the Dodge brothers in case the court should finally grant their petition for an injunction to prevent his operations.

ordinance for left turning, requiring motorist to pass around center of street intersection, is obeyed, the turn is not started until after the crossing is passed, and when a right turn is made, the same applies for the first crossing, and the people on the intersecting street crossing can readily see the whole bulk of a car making the turn, and need no further warning. In other instances, when there is a doubt which way a car is to turn, a slight hand movement is all that is needed.

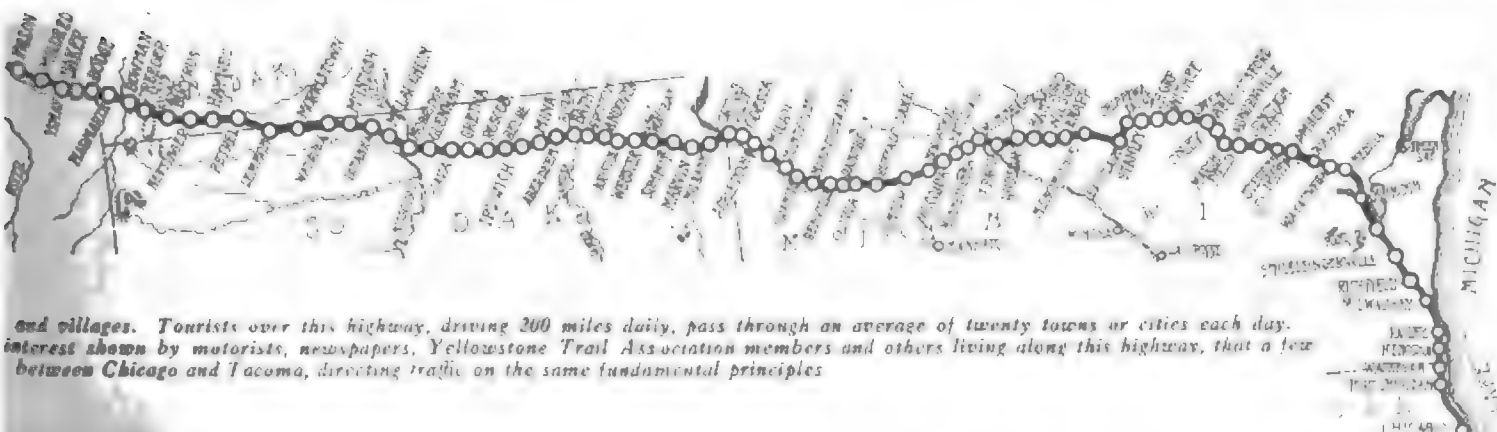
As far as the traffic officer is concerned, he will not pay any attention to a traffic signal, for the very simple reason that he does not need to.

Purpose of Arm Signal

The arm or hand signal was never intended for the man ahead as Mr. Cerf seems to imply, but is for the sole purpose of notifying the following car or the traffic officer, and the traffic signal is intended to do away with the arm movement, in so far as the following car is concerned. When the car is inclosed, an arm signal cannot be seen from the rear but can be seen by a traffic officer.

The horn was originally intended for the warning of the pedestrian, just as the bell used to be on the bicycle, but both have passed, in fact, some cities and rightly too, have ruled against the use of horns except in the most modest way. The bell and horn are the direct cause of many accidents, on account of startling and confusing people, who otherwise would have walked on out of danger. They stop, often turn around, step back or directly in the path of the car. Follow up most any street accident and you will find that the motorist is rarely to blame.

One would think from a reading of Mr. Cerf's article that a motorist never walked, whereas in fact, he walks the downtown streets quite as much as the average pedestrian who does not own a car, and is just as anxious to have sane and careful driving as anyone, for he realizes that his family or parents may not be as agile or careful as himself. We will admit that there are a few drivers that should be ruled off the streets, and will be sooner or later, but the average motorist is extremely careful of the rights of others, and has it in for the "road hog" just as much as anyone.—Edwin H. Roberts.





The Midway line from which passengers board to observe the parade in front city.

A School That Uses Motors as Textbooks

By L. E. Midgley

ONE OF THE most recent methods of teaching the science of the motor is to use the motor itself as a textbook. This is the principle of the Midway School, which is the only school in the world where the motor is used as a textbook. The school is located in the city of Midway, and it is the only school in the world where the motor is used as a textbook. The school is located in the city of Midway, and it is the only school in the world where the motor is used as a textbook.

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By David S. H. H.

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Black neighborhood for new building information before construction.

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Students studying in the new building. The school board is not the only one who has used the site.



The hole in the concrete wall and debris after the explosion caused by a gas leak.

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EXPLOSION IN ROOMS

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EXPLOSION IN ROOMS

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A car was driven through the crowd after the explosion in the room.

Helping the Motor Car Recruit U. S. Soldiers

THE MOTOR CAR RECRUITING DRIVE IS A CAMPAIGN TO RAISE MONEY FOR THE PURCHASE OF CARS FOR U. S. SOLDIERS.

THE DRIVE IS BEING HELD IN ALL CITIES AND TOWNS WHERE THERE ARE U. S. SOLDIERS.



SMALLER CROWDS ARE ALSO GATHERING FOR THE DRIVE.

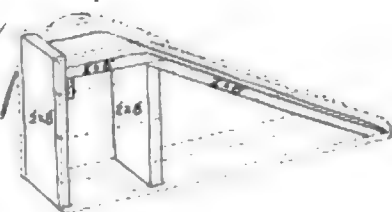
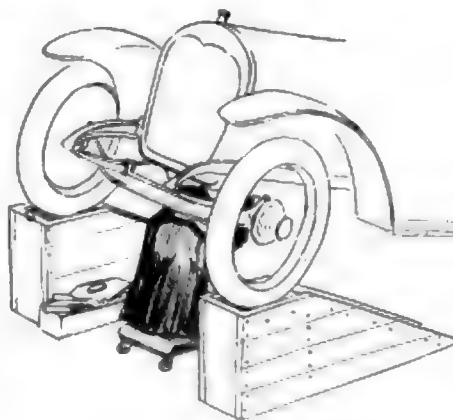
THE DRIVE IS BEING HELD IN ALL CITIES AND TOWNS WHERE THERE ARE U. S. SOLDIERS.

The Motor Car Repair Shop

Easily-Made Wooden Repair Stands

Removes Crankshaft Bearings

BROOKLYN, N. Y.—Editor MOTOR AGE—The following method has been found to be a very simple and efficient one for removing a ball bearing type crankshaft, and minimizes the danger of breakage of parts. When the engine has been disassembled and the crankshaft is ready for removal, take an ordinary gasoline blow torch and heat slowly and evenly the surrounding crankcase and the metal case surrounding the ball races which acts as a retainer. This ordinarily is of aluminum and expands considerably faster upon being heated than the steel ball races, thereby releasing them somewhat. Having heated the case thoroughly, take a block of wood and hammer, (wood preventing shaft being damaged by blows), and drive shaft out slowly from one end, striking very light blows. Upon replacing, the same idea may be used, heating the case and then driving the shaft in.—J. Edgar Finn.



Repair stands made from 2 by 8 planks and 1-in. siding

Removes Battery Connector

EDITOR MOTOR AGE—I give you a description of a little instrument that has been very useful to me, and may prove so to some one else.

I live 30 miles from a Willard service station, and recently I had to remove the battery from my car to send it away for repairs. I found the connector so tight in the battery post that it was impossible to remove it, and I had to cut the wire to get the battery out of the box.

Anticipating this same trouble again, I got a blacksmith to make me a pair of ordinary blacksmith's tongs 20 in. long. The handles are $\frac{1}{2}$ -in. iron and one of the jaws $\frac{1}{2}$ -in. longer than the other.

The longest jaw is 3 in., and has a slot in it to let it go over the battery cable. The slot is 2 in. long by $1\frac{1}{2}$ -in. wide, and by backing off the screw in the end of the connector a little power will get the connector out easily.

This will not benefit anyone who lives near a service station but lots of people will find it very useful, as I have used it a number of times.—Edwin D. Shafer.

Removes Radiator Scale

MINNEAPOLIS, Ind.—Editor MOTOR AGE—For taking the scale out of radiators, mix 1 qt. sweet milk to each gallon of water, have the solution boiling

hot and fill radiator two-thirds full; run the engine for 20 or 30 min., then drain and wash out with clear water. This will loosen all rust and scale caused by hard water or alkali. I have used this on Ford and Scripps-Booth cars. This will do the work when other solutions or boiler compounds fail. It will not injure any part of engine or radiator.—S. M. Dunbar.

Wooden Repair Stands

AN easily constructed repair stand equipment is illustrated on this page. It is made up of wooden framework using 2 by 8 planks with 1-in. siding to make the stands rigid. A grade of 25 or 30 deg. is an easy ascent for a car and the stands should be made accordingly.

It would be well to let the siding hang over about an inch on the runway sides and on top to hold the car in its course should it be guided carelessly up the runway. Stands of this pattern are being used for repair purposes in the Maxwell plant in Detroit.

Finding Polarity of Wires

WEST LIBERTY, Ohio—Editor MOTOR AGE—Referring to the communication from James H. Webb on finding polarity of wires by use of potassium iodide, in the March 22 issue; a much more available method is to use a solution of common salt in water, the stronger the better. Dip the two wires in solution and from $\frac{1}{4}$ to $\frac{1}{2}$ in. apart. The positive terminal will give off a spray of gas bubbles, the intensity or amount of the bubbles depending on the strength of the current and the distance between the terminals, and will be

plainly visible. The negatives remain inactive.—B. S. Elliott.

Protection Against Fire

DAVID B. ROBERTS, general manager of the Hartford Buick Co., Hartford, Conn., has rigged up various tools for his especial purpose. Among them is an overhead trolley drop light which may be run from one end of the 200 ft. building to the other. To protect the place from fire Roberts has suspended from the ceiling a half dozen Pyrene fire extinguishers. These are attached to cords by means of fine, coiled copper wire. The Pyrenes are within reach of the hand and when grasped the wire unwinds. They are so placed as to afford the best protection.

Cures Missing Studebaker

CULVER, Ind.—Editor MOTOR AGE—Some time ago I had considerable trouble with the two rear cylinders on a Studebaker 4-40, 17 serial, missing irregular. After cleaning and testing the spark plugs, testing the ignition, cleaning the valves, and readjusting the carburetor I had the same results.

The Studebaker is equipped with a Stewart vacuum system and after disconnecting the tube which connects the vacuum tank to the intake manifold which enters the two rear cylinders the engine began to fire regularly and perfectly for a minute. I decided to drill a hole just above the carburetor and tap it with a $\frac{1}{8}$ -in. pipe tap and connect the pipe from the vacuum tank to this opening. After I had it completed the engine ran splendidly with power and speed. I have no more missing cylinders.—Ralph Cook.

Johnson and Liberty Springfield Types



THESE THREE MEMBERS OF THE FIVE-STAR COURT OF THE 1980s, in the aftermath of the infamous Watergate scandal and the passage of the Ethics Reform Act, are now working to bring about a new era of transparency and accountability in government. The National Endowment for the Arts, the National Endowment for the Humanities, and the National Endowment for the Sciences and the Humanities are all part of the new era of transparency and accountability in government.

By using smaller, multi-component fibers, we believe, there are no longer serious problems with fiber breakage, and the manufacturing process is less complicated than for large fibers. And the price of the fiber may be lower than that of large fibers, says John W. Smith, president of the Fiber Optic Association, a Washington, D.C., trade group. "This is the first time that the technology exists to make the low-loss, low-cost, low-loss fiber," says Smith. "This is the first time that the technology exists to make the low-loss, low-cost, low-loss fiber."

[illegible]

These results suggest that the presence of a
large number of small firms may be associated with
higher productivity. This is consistent with the
idea that small firms are more innovative and
more flexible than large firms. However, the
results also suggest that the presence of a large
number of small firms may be associated with
lower productivity. This is consistent with the
idea that small firms are less able to attract
investment and to benefit from economies of
scale.

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that the two main components of the model are the *independent* and *dependent* variables. The *independent* variable is the variable that is being manipulated or changed by the researcher. The *dependent* variable is the variable that is being measured or observed. The relationship between the two variables is the focus of the study.

Abstract

James Watt (1736-1819) The Scottish inventor who, with James Black, was a strong proponent of the use of steam power in the textile industry. Watt improved on the Newcomen steam engine by adding a separate condenser. The Watt steam engine revolutionized textile production by enabling a plant with the equivalent of 100 horses to produce 100 times as much cloth as a traditional water-powered mill. It is a fact that Watt's invention, together with other innovations, including the spinning machine, revolutionized the textile industry and gave the steam engine its place in the history of the world.

1000

James, says, "The company has taken the correct approach in the past, and we will continue to be working with them to get the best deal for our customers."



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Care must be taken to twist it clear through so that the bottom of the piston grinds against the bottom of the cylinder, making an even job from top to bottom. This is not as difficult as it might seem. The jobs I have done were to correct oil pumping and overcome all noise, therefore were fitted closer than for a racing job. I expect the piston to show the effect of grinding so that the original roughness is about smoothed down. It must fit close enough so that it is difficult to move dry, but will work easily if kerosene is applied. A piston can fit quite tight, yet crank easily if it fits and is smooth; yet a loose fitting piston may crank hard if rough. The trouble with a rough fit is that though it may seem tight, yet it may not fit good enough on the low spots to prevent oiling.

Now for the abrasive idea. Yes, it is serious. It sticks there. I wiped it good and dry, then washed with kerosene, next drenched it with a small syringe letting the overflow run out. After this I oiled with cylinder oil and repeated. I have opened two of these machines and found the cylinders just as smooth as glass and no sign of trouble after considerable use. It absolutely cures oil pumping.

Probably I should have mentioned the connecting-rod bearings. Note the bolt head next to the camshaft and punch mark the cap so that each rod gets back just as it came out. Then correctly fit the bearing before removing the old piston, because the new piston will show up a loose bearing in a hurry if you leave one and will be so tight that you cannot feel the bearing with it connected. I did not lap the rings, believing the cylinder walls to be in condition soon to get them in position, which has proved very satisfactory.

In starting I used 2 qt. of the best light cylinder oil above the top cock. While a little worked up, it made no trouble the first 500 miles, not even a dirty spark plug, and it was almost necessary to insure plenty of lubrication on new work.

This work correctly done gives you an engine far more powerful and silent than any new Ford engine.—W. F. Black.

WHY HIGH TEST FUEL OVERHEATS

Reader Errs in Explaining Experience on Kerosene Basis

Des Moines, Iowa—Editor MOTOR AGE—In your issue of March 22 I note your reply to inquiry of T. H. Merson with regard to the burning of a mixture of benzine and kerosene.

Relative to this, allow me to detail my experience: I was not using so high a test of fuel as benzine but was using the highest test gasoline I could get in a 1914 Mitchell big six. The mixture was approximately half and half. I had not gone a few miles when the car began to heat up rapidly and soon boiled. Every little while I had to stop and add water to make up for that boiled out through the overflow. Whenever I started after putting in fresh

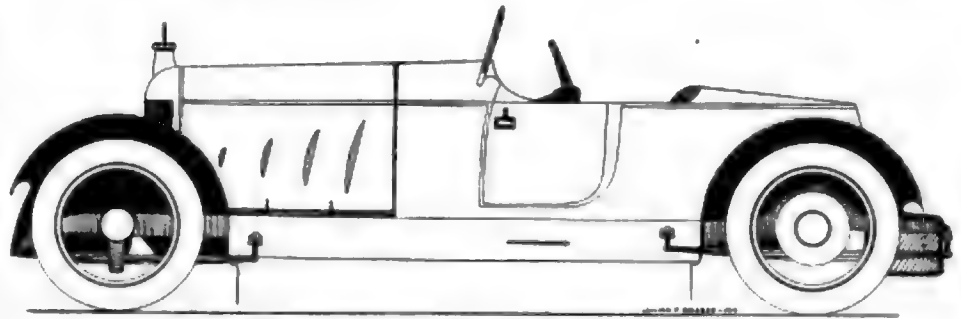


Fig. 2.—Horizontal lines are necessary for beauty in a luxurious sporting car, according to a reader's idea

water, I noticed that it seemed to turn stiff, but did not investigate. Later on the engine turned harder and harder until finally when I threw out my clutch the engine stopped. I drained the oil in a bucket, took down the engine, drew out the pistons, oiled and replaced them and returned to town, stopping every little while to allow cooling.

The fact that I wish to bring out is this: In burning a mixture like the one in question with the ordinary gasoline carburetor, I used a well-known carburetor, the mixture necessarily must be so rich, to obtain enough volatile fluid to produce an explosion, that it is very hard to obtain an adjustment that is satisfactory at all speeds, in the first place.

Second, taking into consideration the above, the lower grade fuel is not properly vaporized and merely burns in a flame, producing direct heat with no power.

Third, in the time allowed for the power stroke this low grade material does not all burn and there is more or less that drags on the piston wall. This kerosene cuts the oil as fast as it is deposited there, thus increasing the friction and again producing heat.

Fourth, a percentage of this low grade fuel will pump past the rings and, entering the oil reservoir, lowers the lubricating value of the oil, thus producing more heat and less power to overcome friction.—N. E. Evans.

You give your experience with a high test fuel and draw your conclusion on the

basis of a low test fuel, such as kerosene. Your reasoning concerning the action of kerosene is correct but does not fit high test gasoline or benzine. These high test fuels overheat the engine because of the very high explosive quality of the fuel.

EXPLANATION OF GAS TURBINE Layout of Simple Type Illustrated and Described

Harrold, Tex.—Editor MOTOR AGE—Explain the gasoline turbine.—F. E. Trisler.

A layout of one type of gasoline turbine is shown in Fig. 1. The entire power-plant consists of a rotary air compressor, combustion chamber, fuel inlet and a casing within which are turbine blades.

Air is forced under pressure from the air compressor into the explosion chamber furnishing oxygen for burning the gasoline which enters through the small fuel pipe. The burning gases expand through the nozzle shown in the sketch and enter the turbine blades at a correct angle to drive them forward without power loss. These turbine blades might be compared to a paddle wheel of a boat except that they are driven instead of driving members. In the process of expansion the gases pass from the first moving turbine wheel through a stationary wheel into another moving wheel through another stationary wheel and then into another moving wheel from whence they are exhausted through the opening shown in the illustration. It is virtually a triple-expanding engine with the stationary blade holders serving as valves. Of course the moving turbine wheels are the driving members of the turbine.

Moth Balls in Gasoline

New Orleans, La.—Editor MOTOR AGE—I am told that if I were to put one camphor ball, the ordinary moth ball, to each gallon of gasoline, that I would get more mileage and less carbon. Is this a fact?

2—Would the life of tires be shortened, and would I get less mileage from same, if I were to buy them 2 months before using them?—J. P. Baldwin.

1—Moth balls are often used in gasoline with a view to increasing the mileage, but there have been no official tests to show that there is a marked effect. It is unlikely that one moth ball in a gallon of gasoline would have much effect.

2—It depends entirely on what care you took of the tires. If they were kept in a cool, dark place, wrapped in cloth or paper, they would be as good as new when you wanted to use them. If they were left

Inquiries Received and Communications Answered

W. F. Black.....	Walnut, Ill.
N. E. Evans.....	Des Moines, Iowa
F. E. Trisler.....	Harrold, Tex.
J. P. Baldwin.....	New Orleans, La.
H. H. Miller.....	Bellefontaine, Ohio
B. H. Olsen.....	Brookfield, Mo.
E. T. Heath.....	Anaconda, Mont.
M. A. Walker.....	Dillon, Mont.
Howard Harvey.....	Bethany, Neb.
T. E. Harrison.....	Aberdeen, S. D.
A. Reader.....	Pleasanton, Neb.
Ralph R. Wilson.....	Frankfort, Ky.
E. A. Weber.....	Deep River, Iowa
A. M. Woodward.....	Janell, Tex.
Donald Boston.....	Fort Collins, Colo.
A. Reader.....	South Nelson, N. B.
Marshall Runge.....	Franksville, Wis.
H. L. Johnson.....	Bridgewater, Iowa
L. F. Snoddy.....	Kansas City, Mo.
A. Thomas.....	Portland, Ore.
G. E. Plumstead.....	Buffalo, N. Y.
F. T. Sargent.....	Belvidere, Ill.
J. E. Pierce.....	West Allis, Wis.
L. C. Vandoozer.....	Windold, Kan.
W. R. Brown.....	Donner, Kan.
C. W. Mathviet.....	Cleveland, Ohio

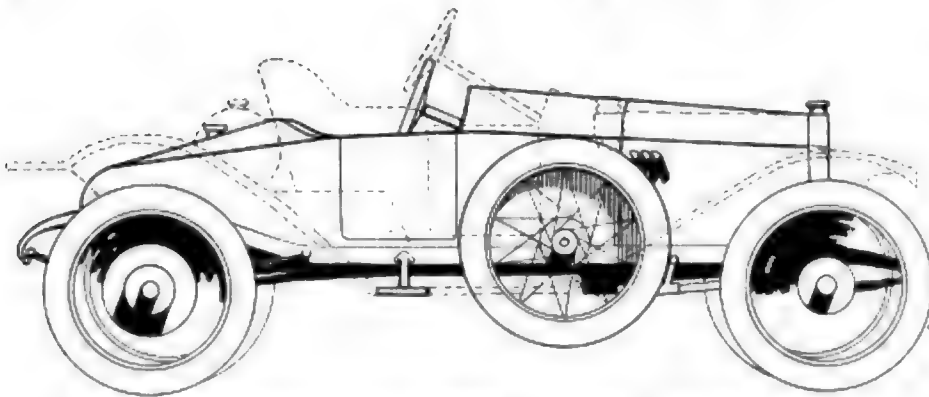


Fig. 3—Simple and inexpensive body design for application to 1912 Buick model 28 roadster

where sunlight or heat could get at them the rubber would lose some of its wearing ability even in that short time.

1912 BUICK MADE INTO SPEEDSTER Sketch Given of Simple and Inexpensive Body Design

Bellefontaine, Ohio.—Editor MOTOR AGE—I have a 1912 model 28 Buick roadster car which has been run 15,000 miles. The engine is in good condition and nearly as quiet and smooth as it ever was. I would like suggestions for changing it into a speedster; also a sketch.

—H. H. Miller.

In Fig. 3 is a sketch showing a speedster body with modern lines as it might appear on a Buick model 28. Inasmuch as this is an old car and for that reason would not merit an expensive body the design has been made with simplicity and economy in view. There are straight sides conforming with the frame to the rear of the car and there the end of the body rounds over in a simple sweep. The same gasoline tank is used and buried under a sloping rear deck. The same seats could be built into the body or bucket seats could be fitted. The cowl piece makes a simple sweep from the straight sides of the body in a gradual curve and this conforms with the lines of the new hood. Wire wheels with a spare carried on the side are shown. Although this would give a classy appearance it is doubtful whether the expense would be advisable. One should be able to build such a body for \$200.

INFORMATION ON MODEL 30 BUICK Size of Piston Rings and Data On Lubrica- tion

Brookfield, Mo.—Editor MOTOR AGE—I have a Buick Model 30 and want your advice relative to the following:

- 1—What is the size of the piston rings?
- 2—How can one ascertain if there is sufficient lubricating oil in crank case on this model?
- 3—What form of lubricant is recommended for the differential, transmission gears and timer gears? What is the proper level at which lubricant should be kept in above places?
- 4—How often should the engine be taken down and overhauled, even though it runs smoothly?—B. H. Olsen.

1—The piston rings used on the model 30 are $\frac{3}{4}$ in. in diameter and $\frac{1}{8}$ in. wide.

2—Engine oil is introduced into the front breather tube and is carried in a reservoir on the side of the crankcase from whence it is drawn by the oil pump and delivered to the engine in small quantities. The oil can be seen flowing through the sight feed on the dash as it is used. If the

pump is properly adjusted it will just maintain the level of oil in the splash troughs in the crankcase, and the correctness of this level can be determined by removing the plugs from the side of the case which are for that purpose.

3—The differential should run in heavy steam cylinder oil and the case should be filled to the level of the filler opening. The timing gears are automatically lubri-

IN WRITING AN INQUIRY TO THE READERS' CLEARING HOUSE DEPARTMENT DESCRIBE THINGS COMPLETELY!

If your car is giving trouble, tell us all about the trouble and what you have done to try to remedy it. Always bear in mind that we are looking at your car when we are reading your inquiry. Try to picture everything to us as we might see it if we were looking at your car.

Do not write in and say, "My engine has developed a serious knock. What is the trouble and how can I remedy it?" It is as impossible to give an intelligent answer to such a question as it is to answer the question, "Why is a mouse?" Tell us where the knock is, what it sounds like, what effect it has on the operation of the engine, under what driving condition it is most evident, etc.

Do not ask us questions concerning motorcycles and motor boats. Our field does not cover these industries. Do not ask us for working drawings of engines, gearsets, etc. We endeavor to conduct an information department, but not an engineering department of such a nature. We cannot design the mechanical units of a car for you. This also applies to specifications for speedster bodies to be applied to touring or roadster equipped chassis. We will gladly give a general plan of a body, showing how it might appear when complete, but we cannot furnish complete patterns and working drawings for the construction of these bodies.

cated by engine oil from the crankcase and require no separate attention.

4—There is no reason why the engine should be taken down and overhauled as long as it operates in a satisfactory manner. If bearings become loose and the engine becomes noisy in a manner that cannot be quieted by adjustment, then the engine should be overhauled. But if everything runs well leave well enough alone.

GAS LINE COILED ABOUT EXHAUST Better to Heat Air—Gasoline Might Reach Boiling Point

Anaconda, Mont.—Editor MOTOR AGE—Would a heated gasoline feed line be of help in getting more mileage out of a gallon?

My idea has been to take the gasoline feed line and coil it twelve or fifteen times around the exhaust pipe, but keep it away from that pipe about $\frac{1}{4}$ or $\frac{1}{2}$ in. by setting in four or six strips of some hard asbestos and then enclosing the whole coil in a round sheet-iron housing so as to hold the heat. Would this arrangement be dangerous by the gas becoming too hot?

2—I have just overhauled my 1912 Cadillac. The exhaust and intake manifolds are on the same side. Would it improve the running and power if the two manifolds were roped together with asbestos sheeting and held with copper bands? No matter how long the engine runs the intake manifold is always cold from the carburetor to the cylinders. My idea is to heat the intake with the exhaust. What is your opinion on this?—E. T. Heath.

1—Heated gasoline will vaporize more readily than cold gasoline. However, this method you suggest would have to be handled with care inasmuch as a little too much heat would boil the gasoline with the result that the mixture would be affected and the engine would not fire properly. The writer has seen examples where the vacuum-tank pipe was located so near the cylinder block that the heat of the engine boiled the gasoline with the result that the engine would miss and lose power. The danger of fire would exist no matter how carefully you wrapped the piping. It is better to heat the air.

2—This idea is a good one. You should secure better carburetion by such means.

Hupp Compression Increase

Frankfort, Ky.—Editor MOTOR AGE—Is it possible to increase the compression of a Hupp mobile?

2—Can this be done by increasing the length of the connecting rods; if so, how much? Or would it be best to put plates on the piston; if so, how thick should these plates be?—Ralph R. Wilson.

1—It is possible to increase the compression. It might be that this old engine has lost its original compression and that to bring it back to normal or even above normal would increase the power.

2—It is not recommended that longer connecting rods be used or plates put on the piston. In fact, the only step advisable would be to install non-leaking rings or, if the pistons are loose, a new set of pistons about .015 in. oversize.

Effect of Carbon Deposit

Dillon, Mont.—Editor MOTOR AGE—Why will carbon in the cylinders diminish power, or interfere in other ways with the proper action of the engine; more than decreasing the capacity of the cylinders to the extent of the deposit; provided, of course, that valves are kept properly ground, and that there is never any pre-ignition due to incandescent particles of carbon?—M. A. Walker.

In the first place there cannot exist with in an engine any perceptible amount of

carbon without the possibility of pre-ignition caused from incandescent carbon particles. Eliminating this factor, however, to answer your question the carbon will work itself under the piston rings and either cause them to stick and exert undue friction against the cylinder walls or to allow compression to leak through. The factor of carbon reducing the combustion space is of little consequence in the performance of the engine.

TRANSFORMING A 1916 MAXWELL If Pistons Are of Different Weight Machine Skirt

Bethany, Neb.—Editor *MOTOR AGE*—Give me a sketch transforming a 1916 Maxwell roadster into a sporty raceabout.

2—In weighing and balancing up the pistons connecting rods and wrist pins, if they vary in weight, what is the proper method in reducing the weight of the heavy ones. In other words, where should the piston be drilled to reduce the weight? What method is used to balance the crankshaft not counter-balanced?—Howard Harvey.

1—The sketch is shown in Fig. 6.

2—The weight of the heavy ones should be reduced by machining rather than by drilling. Surely the weight cannot be over a fraction of an ounce if the pistons are of the same design, and this small excess may be removed from the inside of the piston skirt. It is suggested that you micrometer the thickness of the skirt on the light pistons and then on the heavy pistons. You can then determine whether there is enough extra metal to permit removal of enough of the stock to equalize the weights. Putting the crankshaft in a running balance means that the ends of the crankshaft can be suspended on very nearly frictionless surfaces, placed in any degree of rotation and will remain in that position. A method of doing this is to support the crankshaft in roller or ball bearings or by some other method that allows minimum friction and to rotate it. If one side drops to the bottom by gravity, then metal is removed from the checks on that side until it will balance with the other. This process is continued until the crankshaft will remain stationary at any place it may be set in its rotation.

No Magneto on Glide

Deep River, Iowa—Editor *MOTOR AGE*—Is there any way to put a Bosch magneto on a Model "30" 1915 Glide without taking off the generator?—E. A. Weber.

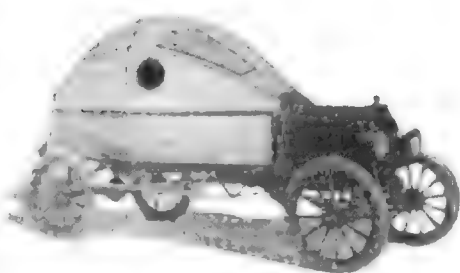


Fig. 4—The "Bug," a canvas inclosed car with folding seats to afford sleeping quarters

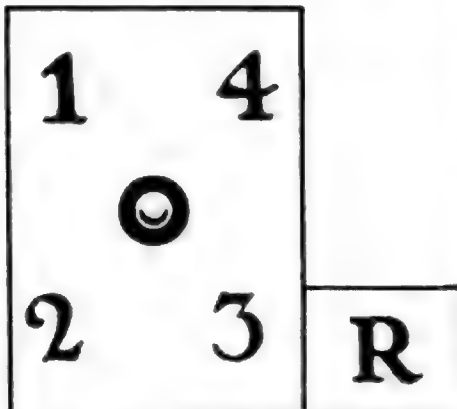


Fig. 5—Diagram of gearshift arrangement used on the new White cars. One has to lift a latch to reach reverse gear

We cannot see any way that a magneto can be put on unless the generator is taken off. The generator installed on this motor takes up a good deal of room on the side of the motor, leaving less than 6 in. between the rear of the generator and the rear motor leg and as the generator does not have an extended shaft at the rear, there would be no way of attaching the magneto.

THE "BUG" CANVAS INCLOSED CAR Seats May Be Folding Beds to Afford Sleeping Quarters

Aberdeen, S. D.—Below are details of construction of the Bug, built by T. E. Harrison and N. A. Goodvin of this city, shown in Fig. 4.

The body is mounted on a Ford chassis with the steering gear lowered. A boat-shaped platform, about 9 ft. long and 4 ft.

wide at its widest part, was used as the floor. Four strap-iron bows were bolted to the floor, the front one bent the shape of the dash, the others round.

Strips of basswood $2\frac{1}{4}$ by $\frac{1}{4}$ were fastened with stove bolts to the bows lengthwise of the body. Galvanized iron 18 in. wide was used around the bottom. Above was bolted flexible board and to this was glued heavy canvas. A narrow molding covers the line where the canvas meets the sheet iron. There are two long windows in front and one round one on each side.

The interior was lined with heavy blue buggy upholstery. Tilting cushions were made to conform to the inside lines of the body. The back of the front seat is divided and mounted on hinges so that they can be dropped level with the cushions. The rear back also can be lowered. With the use of robes this arrangement furnishes a very comfortable bed while on hunting trips and the like. The door is on the right side and hung from the top.

The gas tank was placed on the left running board and a Stewart vacuum tank applied to the left side of the engine. A Brickley heater, which is a local product, was installed. A mirror in front of the left window furnishes a rear view. All fenders were taken off. The cost of material was about \$20 and all work was done outside of working hours.—T. E. Harrison.

READER'S IDEAS REBUILT FORD Would Run Exhaust Manifold Through Hood or to Muffler.

Pleasanton, Neb.—Editor *MOTOR AGE*—Would like to state my idea of an ideal rebuilt Ford. In rebuilding the car it should be kept as light as possible and also practical and economical. It should be underslung on the original springs by putting the front and rear axles ahead of their respective springs; have wire wheels, and the body be streamline without an effect from the radiator back. The rear axle gear ratio should not be changed so the car can take hills in rough hilly country on high, also to keep within city speed limits on high. Pistons and connecting rods should be as light as possible with non-leaking rings, but would not rebore the cylinders as there is not much to gain and the engine should be kept economical. Is it practical to enlarge the valves and ports? I would run the exhaust manifold directly through the hood but just before each lead goes through, I would have a lead going to a muffler and have a valve at each intersection, the four to be operated in a unit as one. I would also change the carburetor, cooling, ignition and oiling systems and would like the car to show a speed of 70 m.p.h. on a suitable track. It should also have small fenders. Please criticize my idea if it is not practical.—A Reader.

Your idea follows the plans of rebuilt Fords which *MOTOR AGE* readers have submitted. Many of them have found it valuable to enlarge the valves as well as

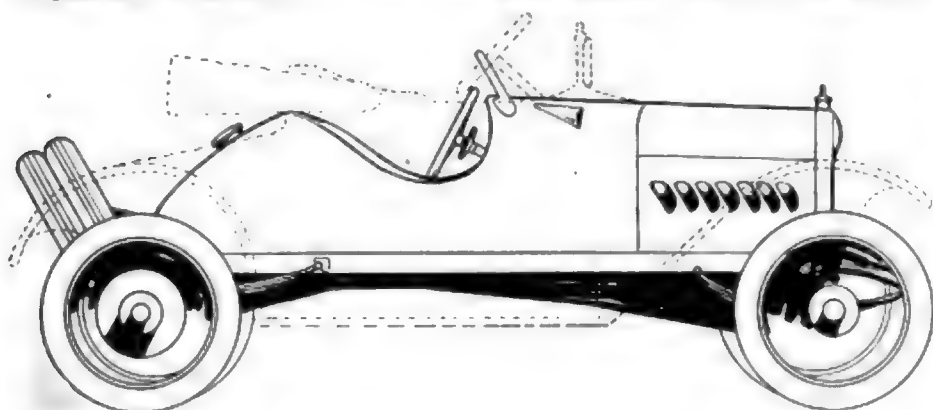


Fig. 6—Body design for transforming 1916 Maxwell model 25 into a rakish sporting type

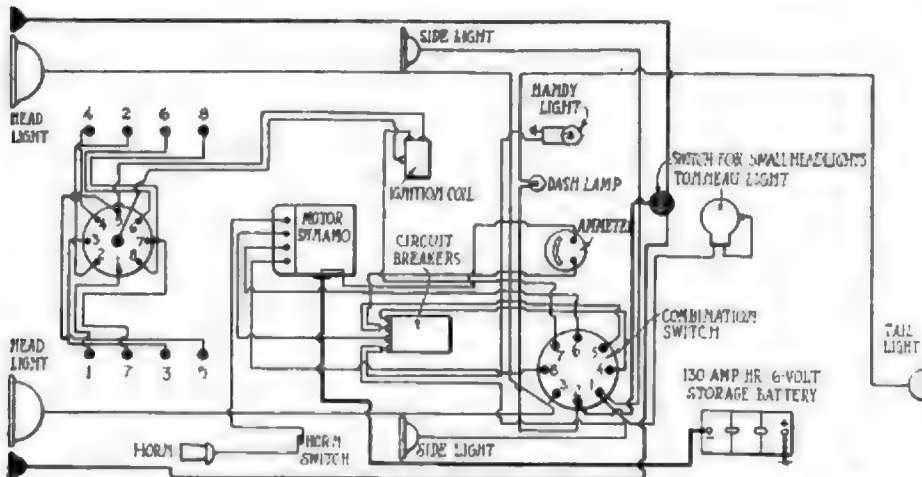


Fig. 7—Showing method of wiring auxiliary lights under headlights of type 53 Cadillac. The wiring includes a switch which will permit auxiliary lights to burn with side and tail lights or for side and tail lights to burn alone

rebore the cylinders. We see no reason for a body so narrow that there is no flare from the radiator back. At best this would not seat over one person and if the body were flared enough to allow seats for two there would not be enough added wind resistance to make an appreciable difference in the speed of the car.

Baxon Valve Springs

Janel, Texas.—Editor Motor Age—I have a Saxon four roadster and would like to have your advice as to using heavier valve springs so as to get the valves to close quicker.—A. M. Woodward.

A cheaper method would be to insert washers under the valve springs, thus shortening their action. This would have practically the same effect as installing heavier springs.

White Gearshift Positions

Fort Collins, Col.—Editor Motor Age—Illustrate by diagram the gearshift positions of the White cars now on the market.

2—Also show a diagram of the generator circuit of the 1916 Maxwell 25 using Simms-Huff.—Donald Boston.

1—The diagram is shown in Fig. 5.

2—The diagram is shown in Fig. 9.

AUXILIARY LIGHTS ON CADILLAC

Wiring Diagram Showing How to Connect Additional System

South Nelson, N. B.—Editor Motor Age—I want to put a pair of auxiliary headlights under the headlights of my type 53 Cadillac Eight. I want these lights controlled by the regular switch that controls the side and tail lights, so that when they are burning, the side and tail lights will also be burning. I will have a switch on the wire to these auxiliary lights, so that when the car is standing the side and tail lights only will burn.

Give diagram showing how to wire these lights from the present Delco switch without changing the present wiring.

Also advise proper size wire to use.—J. L. O'Brien.

The complete wiring of the Delco system on this car is shown in Fig. 7, and in heavy lines on this diagram is shown a wiring layout to conform with your ideas. A wire connected with the tail light wire post on the switch goes to the additional switch which you specify. From here wires are conducted to the two lights under the headlights. With the additional switch turned on the added lights will burn in conjunction with the side and tail lights,

whereas the side and tail lights will burn alone when this switch is turned off.

Use the same wire as is used for wiring the side lights and tail light.

DEFINITIONS OF COMMON TERMS

Formula Horsepower, Hotchkiss Drive, Bendix Drive, Etc.

Brownsville, Tex.—Editor Motor Age—Give brief definitions of the following terms:

- 1—N. A. C. C., A. L. A. M., and S. A. E. horsepower ratings.
- 2—Hotchkiss drive.
- 3—Bendix drive.
- 4—Thermal efficiency.
- 5—Volumetric efficiency.
- 6—Helical gears.

It is not necessary to give illustrations to describe these. I only want a sentence or two on each one so that I will have some idea what a man is talking about when he uses the above terms.—H. C. Gorman.

1—The three ratings are identical. The American League of Automobile Manufacturers, A. L. A. M., was reorganized under

What Not to Ask

Where manufacturers have made official speed records under the sanction of the American Automobile Association, we will gladly print the speed figures made during that test. Where no tests have been made there is no source of positive information regarding these car speeds and we see no reason why we should guess at it.

Furthermore, the idea of anybody estimating within 5 or 10 m.p.h. how much faster a car will go with aluminum pistons, higher gearing, etc., etc., is absurd. A poor mechanic may install new parts intended to increase the speed and do such a sloppy job of it that the speed will, in reality, be reduced.

The same thing applies to the maximum revolutions per minute of an engine. Two engines of exactly the same model may have a difference in maximum speed of 200 r.p.m. Furthermore, when the engines become used, the maximum changes. It depends to such a great extent on the adjustment and general condition of the engine that no reasonably accurate figure can be given. Another thing we cannot give you with any accuracy. That is car weights.

the name National Automobile Chamber of Commerce, N. A. C. C.; therefore the first term is obsolete. The Society of Automobile Engineers, S. A. E., uses the N. A. C. C. rating which is bore times bore times number of cylinders divided by 2.5. N. A. C. C. is the correct term to apply to this formula rating.

2—When brakes or power are applied to the rear axle there is a tendency for the axle to continue its course straight ahead or lag behind, and also to twist. The Hotchkiss principle means that this effort on the part of the axle is checked by the main leaves of the rear springs which have a rigid anchor to the frame. Radius rods or torsion tubes for absorbing the forces are thus eliminated.

3—The Bendix starter pinion is a device attached to the starting motor in which is a spur gear to engage with the gear on the engine, and within this spur gear is a worm gear. When current is applied to the starting motor centrifugal force throws the spur gear out on the worm and thus engages it with the engine gear. When current is shut off the worm gear winds the spur back out of the engine gear.

4—Thermal efficiency means the proportion of heat units contained within the fuel which is utilized for power. An engine with high thermal efficiency therefore transforms a high percentage of the heat units in the fuel to power. Heat is power in an internal combustion engine and the less heat lost the greater is the power.

5—Volumetric efficiency applies to the ability of the engine to fill the cylinders with fresh gas and exhaust the burned gas out of them. The more nearly the cylinders are completely filled with fresh gas and completely exhausted of burned gas the higher is the volumetric efficiency.

6—Helical gears are gears which have their teeth cut at an angle. In a plain spur gear the teeth are cut straight across the periphery of the gear. When helically cut the teeth are at an angle across the periphery, but this should not be confused with spiral gears, which are also cut at an angle but with a spiral cut instead of a straight cut as is the case with helical gears. The design is to give quiet action to the gears.

LIGHTS DIM WITH ENGINE IDLE

Indication that Trouble Is in Battery, Not Generator

Frankville, Wis.—Editor Motor Age—Give diagram of Maxwell 25 Model 1915 electric lighting system. On this Maxwell the lights are very dim when car is not running. I have a 36 c.p. 6-volt bulb in the headlights, and when engine speeds up I get full candlepower. If not more.

2—What is the cause of oil getting up in the first cylinder of a Ford engine. Cylinder wall is O. K., piston is O. K., also rings.

3—Is it best to use heavy or light oil in engine? Marshall Range.

1—The wiring diagram is shown in Fig. 7. If the lights are low when the car is not running and brighten up a great deal when the generator cuts in it is an indication that the battery is not properly charged. It should be examined for defective cells or plates. When the generator

starts delivering current, this current passes through the battery and makes the lights bright.

2—If there is excessive oil pumping in the front cylinder there is something wrong in the fit of the pistons or rings. In theory this cylinder will receive more oil than the other three inasmuch as it keeps cooler, getting the water and air first, and because of its coolness the piston is not expanded as much as in the other cylinder, therefore allows more space for oil to get through. In practice, however, the effect would not cause an appreciable amount of oil pumping.

3—In moderate or summer weather a medium grade of oil should be used. In winter a light grade is advisable.

Taking Up Steering Play

Buffalo, N. Y.—Editor MOTOR AGE—Advise how to take up play in the steering apparatus of a 1912 Stoddard-Dayton Savoy roadster.—G. D. Plumstead.

The lost motion is controlled by adjustment of the bushing which is placed on top of the steering gear housing and through which the steering post extends. Further adjustment can be made by loosening the set screw and moving the eccentric bushing through which the jaw shaft passes. This will bring the worm and sector closer together, eliminating all lost motion.

The ball and socket joints in the steering connections may be the source of some of the play. There are adjusting bolts within these joints.

Ether in Gasoline

Donner, La.—Editor MOTOR AGE—Would you advise the use of ether mixed with gasoline, and if so, what percentage for pleasure cars?

2—Will its use harm the engine?—W. H. Brown.

1—As an economy measure it is out of the question. As a means of securing a slight increase in power and speed it is useful. Its use is forbidden in sanctioned racing. If you want to go to an exorbi-

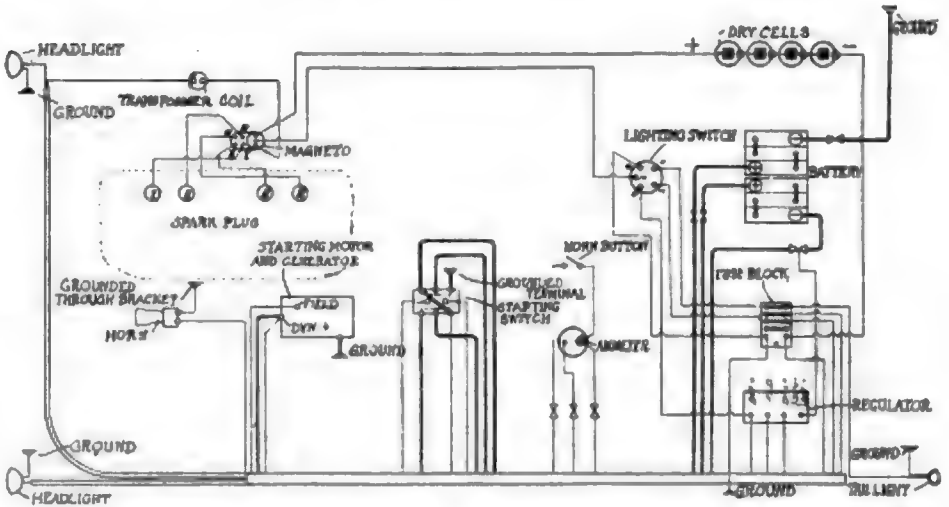


Fig. 9—The Simma-Huff starting, lighting ignition system as applied in the 1915 Maxwell model 25

tant expense to gain slightly more power you might mix an ounce with a gallon of gasoline. More than that or even that much may cause your engine to overheat.

2—If too much is used overheating will result.

Marmon 41 Wiring

West Allis, Wis.—Editor MOTOR AGE—Publish wiring diagram of the 1915 Marmon speedster Model 41.—J. E. Pierce.

Illustrated in Fig. 8.

Enlarging Trumbull Valves

Portland, Ore.—Editor MOTOR AGE—Would enlarging the valves of a four-cylinder Trumbull cyclecar increase the power, and how much could they be enlarged? It is a 2 1/2 bore and will do 45 m.p.h., but does not seem to make hills on high very well. I have four non-leak rings in it.

2—Is taking vapor off the water tank into the intake manifold a good idea?—A. Thomas.

1—Enlarging the valves would increase the power. They could be increased 1/8 in. on a side or a total of 1/2 in. diameter without weakening the walls.

2—Yes.

Help for V. C. Williams

Belvidere, Ill.—Editor MOTOR AGE—I noticed an inquiry in the March 22 issue

by V. C. Williams of Ripley, Ohio, and am sending suggestion in answer.

I have driven a 1914 Hudson six-40 three seasons. The first season I had much the same trouble as Williams. This was caused by a tight tappet, thus a loss of compression.

Would suggest that Williams look his valves over and see that the tappet clearance is .003 in. or a trifle more—by no means less, as the heat of the engine expands the metal. Also see that the valve stems are not gummed so as to stick.—F. T. Sergeant.

Not Too Much Air

Winfield, Kan.—Editor MOTOR AGE—I notice that all late models of cars are making an effort to get more hot air through the air intake of the carburetor. Is it possible to get the air too hot, so that it interferes with the engine working at its maximum power, provided there is always an ample supply of fresh, cool air admitted to the heater?—L. C. Vandoozer.

In drawing the hot air from the engine itself, either from a stove on the muffler or through indirect heat by water jacketing, there is no chance of getting too much hot air.

Lean Mixture Causes Backfire

Kansas City, Mo.—Editor MOTOR AGE—What causes an engine to backfire on too lean a mixture?—L. P. Snoddy.

This is caused by loading. Too lean a mixture means that the engine does not fire every revolution with the result that unburned gases are in the cylinders and manifolds. When enough gas gets in to cause an explosion this extra supply of unburned gas is ignited with backfiring as the result.

Defines Orphan Car

Cleveland, Ohio.—Editor MOTOR AGE—Referring to page 45 of March 15 issue to question, "What is meant by an orphan car?" Motor Age answered, "A car no longer being manufactured." This would class a good many cars as orphan cars.

Reader's Def.: A car whose original manufacturers are not in a position to furnish repair parts for same.—C. W. Mathivet.

An orphan car is one which is no longer manufactured and whose manufacturer is no longer in business. It is a car without a mother factory which is still alive. Your definition is correct.

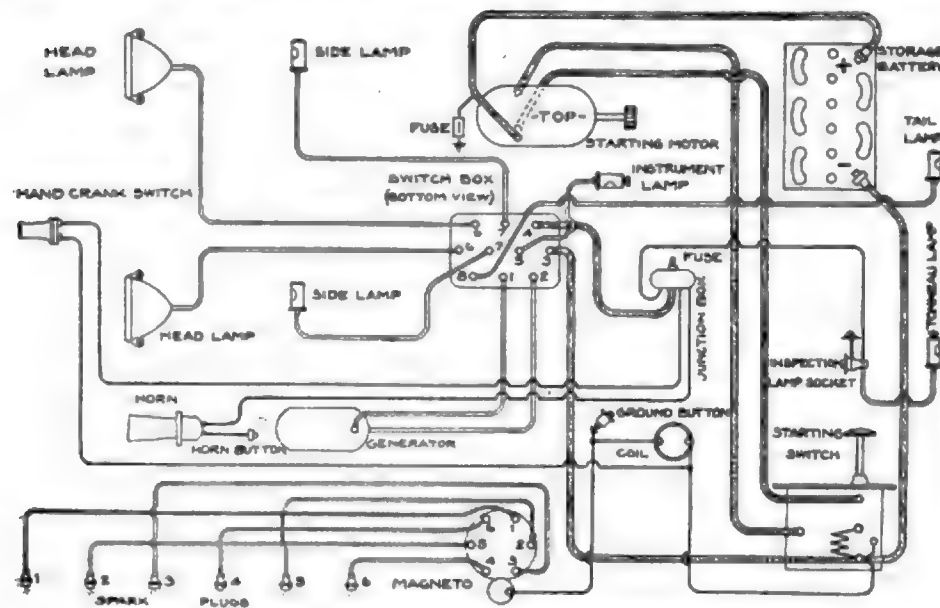


Fig. 8—Diagram of the wiring system used on the Marmon model 41

Among the Makers and Dealers



Abstract

These findings have implications for the design of the training program. The results suggest that the training program should focus on the development of the following skills:

1. *Journal of Management Studies*, 1996, 33, 1, 1-14.

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the authors' findings. The authors conclude that the results suggest that the use of a single, standardized, and validated instrument to measure the same construct across different studies is essential for the validity of the results. The authors also suggest that the use of a single, standardized, and validated instrument to measure the same construct across different studies is essential for the validity of the results.

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Abstract

These studies do not indicate that the use of the model is restricted to the use of the model. The model can be used to study the effects of the model on the model.

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After receiving the 1996 Ig Nobel Prize for "the most beautiful" paper, the authors of the "The Science of the Art of the Fart" paper, which was published in the *Journal of the Royal Society of Medicine*, were asked to give a presentation on their work. The presentation was given by the authors, who were asked to give a presentation on their work. The presentation was given by the authors, who were asked to give a presentation on their work.

...the fact that the *Journal of Management* is a leading journal in the field of management research, and that the *Journal of Management Studies* is a leading journal in the field of management education research.

These results suggest that the use of the proposed model for the analysis of the data obtained from the experiments is a promising approach for the study of the effects of the different parameters on the performance of the system. The model can be used to predict the performance of the system for different values of the parameters, and to identify the most important parameters for the system. The model can also be used to optimize the system parameters for a given performance level. The model can be used to study the effects of the different parameters on the performance of the system for different values of the parameters, and to identify the most important parameters for the system. The model can also be used to optimize the system parameters for a given performance level.

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1. The first step is to identify the problem or question that needs to be answered. This involves understanding the context and the specific requirements of the task.

1. **Identify the main idea.** The main idea of the passage is that the author is discussing the importance of maintaining accurate records in a business setting.

2. **Identify the supporting details.** The supporting details include the author's explanation of why accurate records are necessary for decision-making and the potential consequences of poor record-keeping.

3. **Identify the author's purpose.** The author's purpose is to inform the reader about the importance of record-keeping and to provide practical advice on how to maintain accurate records.

4. **Identify the author's tone.** The author's tone is informative and professional, with a focus on providing clear and concise information.

5. **Identify the author's audience.** The author's audience is likely to be business professionals or managers who are responsible for maintaining accurate records.

There is a growing body of evidence that the use of the word "terrorism" is becoming increasingly common in the media and in public discourse. This is particularly true in the United States, where the word has become a key term in the debate about the war on terror. The use of the word "terrorism" is also becoming more common in other countries, such as the United Kingdom and Canada. This is a reflection of the fact that terrorism is a global phenomenon that affects many countries. The use of the word "terrorism" is also becoming more common in academic and policy circles. This is a reflection of the fact that terrorism is a complex issue that requires a multidisciplinary approach to understand it. The use of the word "terrorism" is also becoming more common in the legal system. This is a reflection of the fact that terrorism is a crime that is punishable by law. The use of the word "terrorism" is also becoming more common in the media. This is a reflection of the fact that terrorism is a topic that is of interest to many people. The use of the word "terrorism" is also becoming more common in public discourse. This is a reflection of the fact that terrorism is a topic that is of interest to many people. The use of the word "terrorism" is also becoming more common in the legal system. This is a reflection of the fact that terrorism is a crime that is punishable by law. The use of the word "terrorism" is also becoming more common in the media. This is a reflection of the fact that terrorism is a topic that is of interest to many people. The use of the word "terrorism" is also becoming more common in public discourse. This is a reflection of the fact that terrorism is a topic that is of interest to many people.

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Environmental and Energy: 25 of 25 pages
This section contains information regarding the environmental and energy issues of the company. It includes information on the company's environmental policy, its environmental management system, and its environmental performance. It also includes information on the company's energy policy, its energy management system, and its energy performance.

THEORY OF THE MIND (ToM) is the ability to understand other people's feelings and intentions. It is a skill that is developed from birth and is essential for social interaction. ToM is a complex skill that involves understanding the emotions and intentions of others, and it is a key component of social competence. ToM is a skill that is developed from birth and is essential for social interaction. ToM is a complex skill that involves understanding the emotions and intentions of others, and it is a key component of social competence.

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No. 16

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ANNOUNCEMENT

The feature of Motor Age for next week will be a story that answers the question as to where old cars go.

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Because it is not easy to distinguish between engine failure and ignition failure—and because many a good engine and many a good car has been condemned for faults of its ignition—and because engine dependability and car performance depend so largely upon magneto dependability and generator performance—the manufacturers of cars of the better class have standardized on "NORMA" equipped electrical accessories. They have found that the use of "NORMA" Bearings in a magneto or lighting generator is an evidence of quality throughout that accessory. They have learned that "NORMA" Bearings are an important factor in assuring the over-all dependability of their car.

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■ **RESEARCH** The 10th anniversary of the 1992 eruption of Mount Pinatubo is being commemorated by a special issue of the *Journal of Volcanology and Geothermal Research*, published by Elsevier. The special issue contains 10 papers, including a review of the eruption and its impact on the environment and on the local population. The special issue is available for purchase as a hardcover or as a PDF file.

Everything is under way in the U.S. to develop a new type of space station, says a representative of the House Committee on Science and Technology. The committee is expected to report on the new station in the next few months. The new station is expected to be a modular station, with modules that can be added or removed as needed. The new station is expected to be a modular station, with modules that can be added or removed as needed. The new station is expected to be a modular station, with modules that can be added or removed as needed.

THE UNIVERSITY OF CHICAGO has selected the 1998-1999 academic year as the first year of the transition to the new 10-semester program. The new program will be implemented in the fall of 1998. The new program will be implemented in the fall of 1998. The new program will be implemented in the fall of 1998.

1. *Journal of Management Studies*, 1996, 33, 1, 1-15.

most of the authors discussed that the economic crisis in the European Union is the main cause of the increase in the number of immigrants. The authors also mention that the economic crisis in the European Union is the main cause of the increase in the number of immigrants.

[illegible]



Physician treating a patient lying down in the wilderness.

concentrated camp in the wilderness State Wildlife Area, where you, physician, would receive immediate assistance. The goal of the wilderness first aid course is to teach you how to respond to an injury or illness in the wilderness. The course will give you the skills to do this. You will learn how to assess a patient's condition, how to provide first aid, and how to transport a patient. You will also learn how to prevent injuries and illnesses in the wilderness.

Wilderness First Aid Course

The wilderness first aid course is a 16-hour course that teaches you how to respond to an injury or illness in the wilderness. The course is designed for physicians and other health care providers who may be called upon to provide first aid in the wilderness. The course covers topics such as assessment, first aid, and transport. The course is taught by experienced wilderness first aid instructors. The course is held in a wilderness setting, so you can learn how to provide first aid in the wilderness.

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A wilderness first aid course in the wilderness State Wildlife Area.

It is possible to have a first aid course in the wilderness. The wilderness first aid course is a 16-hour course that teaches you how to respond to an injury or illness in the wilderness. The course is designed for physicians and other health care providers who may be called upon to provide first aid in the wilderness. The course covers topics such as assessment, first aid, and transport. The course is taught by experienced wilderness first aid instructors. The course is held in a wilderness setting, so you can learn how to provide first aid in the wilderness.

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Topic	Hours
Assessment	4
First Aid	8
Transport	4
Total	16



A delivery made by the Federal Milk-Market Association and its member farms.

heads and horns, some standing, some lying down, crowded in the narrow aisles of the pens. The milkmen, dressed in white uniforms, were busy milking the cows. The scene was a typical one of a large dairy farm. The milkmen were busy milking the cows, and the cows were crowded in the narrow aisles of the pens. The scene was a typical one of a large dairy farm.

The milkmen were busy milking the cows, and the cows were crowded in the narrow aisles of the pens. The scene was a typical one of a large dairy farm.

THE MILK MARKET

The milk market is a very important one. It is the source of the milk that we drink. The milkmen are busy milking the cows, and the cows are crowded in the narrow aisles of the pens. The scene was a typical one of a large dairy farm.

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The show is a Ford Model T, a four-door model.

water is an essential production. An individual's health depends on the quality of water consumed. The treatment of water from the sea is the essential stage of a high-level technology.

Techniques for desalination have been developed in the United States, Japan, and other countries. These techniques are based on the principle of reverse osmosis. Reverse osmosis is a process in which water is forced through a semi-permeable membrane by the application of pressure.

The process of reverse osmosis is based on the principle of osmosis. Osmosis is a process in which water moves from a region of low concentration to a region of high concentration through a semi-permeable membrane.

Reverse osmosis is a process in which water is forced through a semi-permeable membrane by the application of pressure. This process is used to desalinate water.

The process of reverse osmosis is based on the principle of osmosis. Osmosis is a process in which water moves from a region of low concentration to a region of high concentration through a semi-permeable membrane. The process of reverse osmosis is used to desalinate water.

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The water desalination plant at a town here. The house is visible behind the chimney. The water from the plant is used for drinking.

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(Continued on page 410)



The water desalination plant at a town here. The house is visible behind the chimney. The water from the plant is used for drinking.

War Prevents Meeting

Martial Activities Take All of Engineers' Time for Special Work

To Open Washington Office with National Defense Council

CHICAGO, April 16—War conditions resulted in the annual summer meeting of the Society of Automobile Engineers scheduled to be held the last week in June at Ottawa Beach, Lake Michigan, being called off to-day by the council of the society in session here. An extensive canvass of many connected closely with the activities of the society showed a general feeling that few of the members could afford the time to spend four days on the East shore of Lake Michigan or at any other place. Each day finds the engineers more and more engrossed in war activities, and correspondingly fewer of the members with spare time for such a meeting.

Instead of four days at Ottawa Beach it was voted to-day to spend one day on the summer meeting and hold it in Washington, D. C., on Monday, June 25. Washington was decided because not a few government departments are very closely associated in the work of the society and selecting Washington is hoped to not only economize time but materially expedite matters.

Agriculture a Problem

The tractor engineers which recently amalgamated with the S.A.E. are confronted with one of the largest problems of the day—the conservation of our agricultural resources and more intensified agriculture. It has been known for a long time that tractor farming means amazingly more than the mere substitution of motor power for animal power.

This situation has brought the tractor in international importance and the present demand for increased yield from our farms means perhaps a government demand for greatly increased tractor production. The lack of standardization in the tractor field as compared with the motor car and motor truck field makes such impossible for a time. The society faces this problem and its first work in the form of a special meeting will be to get the tractor makers and the government agricultural interests working closer.

For the first time the M. & A. M. is participating in sharing the expense for carrying on S.A.E. standards work. It and the N.A.C.C. have contributed a total of \$10,000 for this.

The summer meeting of the Standards committee in Cleveland on May 3 will take on greatly increased importance this year, and a large attendance from the society at large is expected. Besides the 140 men on the various divisions of the Standards

committee under the direction of Chairman John G. Uts, a call will be made to the society at large to attend, as the work of standardization is of greatest importance in these days of demand production.

It is possible that the new branch of marine engineering recently amalgamated with the society and representing motor boat work such as submarine chasers, etc., will call for a special meeting.

A Washington office of the Society of Automobile Engineers will be opened in connection with the Council of National Defense as soon as arrangements can be made for such. This action decided upon by the council of the society in session here yesterday and to-day was brought about by the closer co-operation of the society with the various government departments, which work is increasing every day.

The Society is well pleased with the results of its co-operation with the Quarter Master's Department as shown by the specifications of the 1.5 and 3-ton military trucks given out this week. It is possible the society will assist in aviation standardization work, and also in the training of mechanics for aviators as well as in training and supply mechanics for many other parts of the service.

MEMBERSHIP DRIVE SUCCEEDING

Chicago, April 17—Additional stimulus was given the present campaign of the Society of Automobile Engineers by the council of the society in session here declaring that April 25 will be known as Membership Day. On that day each member is asked to give up practically the entire day to getting new members.

So far the membership campaign has been a great success and some of the sections have already doubled their membership. At to-night's meeting of the Midwest section, held at the Chicago Automobile club, the section announced that it already had twenty new applications and a telegram was read by Councillor Muskovic of the Indiana section stating that that section with a membership of fifty-five has already fifty new applications. No word has come as yet from Detroit where the headquarters of the membership committee are located, but it is expected that Chairman R. O. Gill of the membership committee of the S.A.E. will have one additional applicant for every present member in the Detroit zone. Rumors have it that one Detroit engineer has already thirty applications as a result of his individual efforts.

CINCINNATI TO DONATE MOTORS

Cincinnati, Ohio, April 14—Business men of the Queen city have offered to raise money by public subscriptions for the purchase of a motor ambulance, four 2-ton trucks, seven motor kitchens, six light touring cars and two motorcycles for the use of the First Regiment of the Ohio National Guard, which is preparing to mobilize for war service.

Owners May Volunteer

A. A. A. Considers Plan for Emergency Enlistment Throughout Land

War College Approves—Expects No Commandeering of Vehicles

WASHINGTON, D. C., April 13.—Motor car and motor truck owners can volunteer with the understanding that their services are offered for emergencies, according to the plan the American Automobile Association is considering with the encouragement of the War College.

The War Department takes the position that it can assume no obligations of any character, but is frank to express its approval of the scheme, provided it is in harmony with the organization plans already worked out by the army officers. It also was stated at the War Department that such co-operation with the Government on the part of the car and truck owners will not be under the direct auspices of the Department.

War Department officials do not anticipate that it will become necessary to commandeer private cars for war use, as the supply of both motor cars and trucks suitable for such work is more than adequate at present.

The appointment of the Motor Transport Reserve Committee by the Council of National Defense makes possible a definite plan for the mobilization of motor trucks and motor cars for emergency needs in any part of the country. Motor clubs throughout the country also are active in organizing the car and truck resources of the country to meet war requirements. The work of the committee goes further, however. It will prepare a definite plan for organization of available drivers and mechanics needed for such a mobilization and the necessary layout of suitable highways for transportation purposes will come under its work.

500 AMERICAN CARS AT FRONT

Paris, April 13—Section sixteen of the American Ambulance Corps left for the front to-day. Seventeen Americans in two sections will leave within the next fortnight, bringing the number of cars in the American service up to 500.

DETROIT AS AIRPLANE CENTER

Detroit, April 14—The Aero Club of Michigan launched a campaign last night to make Detroit the chief center of the aviation industry in America and, with the immediate object of promoting public interest in air transit and the manufacture of airplanes, bringing a Government school of aviation to Detroit, obtaining an aviation field and increasing the club's roster to 5000 or more.

About 800 engineers, manufacturers, mechanics and others accepted application blanks. G. Douglas Wardrop, editor of *Aerial Age*, discussed airplanes in Europe and told of the important part they played in the war.

"It is authoritatively estimated that there are 100,000 or more airplanes in use by the warring nations," said Mr. Wardrop. "In England alone there are about fifty factories devoting from half to three-quarters of their time and energy making planes. There are nearly 3000 dirigibles in use alone."

"Every trained aviator that America sends to Europe is worth more than 200 soldiers. We do not hear so much now of the gas attacks as we did last year or of contact patrol attacks. Aeronauts become even more dangerous foes to the man in the trenches than gas. With powerful machine guns on board, they hover over enemy trenches and mow down the men. It is through the work of aviators that the official recording of yardage gained and lost every day is learned."

GEM MAY BUILD AIRPLANES

Grand Rapids, Mich., April 13—The Gem Motor Car Corp. of this city has been offered a contract to build 1000 battleplanes following specifications by French engineers. The contract has not been accepted, pending local developments.

TROOP PROTECTION OF PLANTS

Washington, D. C., April 14—The blowing up of the Eddystone, Pa., shell-making plant and the reported attempts to destroy manufacturing establishments of various kinds which might be engaged in making supplies for the Army and Navy may lead to the employment of troops to guard such establishments, motor car and otherwise, at such times as the Government begins drawing on these plants for their output.

Under the policy of the War Department, which is to give out to the public no advance information touching the uses to which different units of troops are to be put, troops now are being employed—state troops called into the government service—to look after certain private plants devoted wholly or in great part to the manufacture of munitions. It is anticipated that any plots aimed at the crippling of the Government in its war operations will be aimed first at those establishments which manufacture articles of a death-dealing character, and not such plants as turn out incidental, although important, adjuncts to an army, such as motor cars, trucks and motor accessories.

The delay in the ordering of motor trucks by the Government, made necessary by the time required in recruiting the army means, of course, that the Government heads do not at this time have to give to the protection of motor car and accessory plants that attention which it is giving to certain munitions plants, bridges, water supplies, public buildings, etc.

War Effect Is Gradual Most of Motor Industry is Awaiting Government's Orders

Car and Parts Production as a Whole Remains Normal

DETROIT, April 16—Industrial preparedness and war needs are gradually affecting the motor car industry, though motor car production continues at a normal rate. The great majority of manufacturers still await instruction from the Government, and it is believed that many will not be asked to participate in the preparedness operations. Some already are engaged in the manufacture of munitions, army trucks and airplane engines, but have not been forced to reduce their production of motor cars or parts.

As the situation now stands there are four large motor car makers either manufacturing or preparing to manufacture trucks and airplane engines, three truck manufacturers making army trucks and several parts concerns manufacturing shells, gun-sights and other military necessities. Of these but one parts maker has reduced normal production to allow for munitions activities.

One carburetor maker recently has completed new furnaces which the Government found suited for the manufacture of castings used in assembling war munitions, and arrangements have been made so that this concern will shortly engage in that work. A western manufacturer of carburetors has arranged with the Government for airplane engine construction and soon will enter that field. This maker already has made a special aluminum aviation engine weighing 397 lb., which has been found satisfactory.

U. S. Tags on Trucks

A large motor car maker, who refuses to give any information as to Government work, has replaced the usual state license tags on its service trucks with the tags used by the United States army.

The employees of the Reo Motor Car Co. have organized and are holding meetings to sign up anyone who desires to enlist for military training and volunteer service. The officers are members of the Reo Rifle club which has been equipped by the Government.

The Saxon Motor Car Co. is encouraging the enlistment of its employees in the army or navy by promising financial aid and participation in any bonuses earned in their absence, as well as guaranteeing the men their present positions on the termination of the war. Men of seafaring experience who will enlist will be paid the difference between their present earnings at the Saxon factory and the wage paid by the Government during their service until the Government makes satisfactory

provision for caring for dependents of enlisted men. The company makes this offer to experienced men for the navy because the navy is the first line of defense and the Government is particularly anxious to recruit it to its full strength.

Motor equipment valued at \$100,000 and ranging from small side cars to touring cars, army trucks and armored machine gun cars will form the equipment of the Thirty-first Michigan regiment when the plans of motor car makers are completed. The plan includes the motorizing of the machine gun company at a cost of \$50,000 and the donation of trucks, touring cars and side cars valued at another \$50,000 to the different battalions of the regiment. This probably will make the regiment one of the best motorized units in the National Guard. The Owen & Graham Co. donated a truck several days ago, and a group of car makers, who at present prefer to remain in the background, will add \$50,000 worth of the equipment.

BRISCOE PRICES ADVANCE

Detroit, April 17—Special telegram—The Briscoe touring car, four-passenger and two-passenger roadster advance from \$685 to \$725; delivery car, open style, from \$700 to \$735; delivery car, panel body, from \$725 to \$765, effective May 1.

FORD WAIVES BRITISH RIGHTS

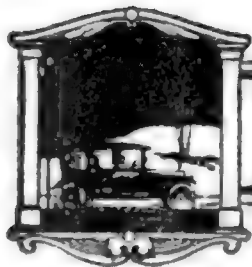
Detroit, April 17—Special telegram—It is reported here that Henry Ford, at the request of the British government, has waived all patent rights on his farm tractor and has cabled the specifications to England so that Great Britain can make tractors for use in the British Isles and in France. It is believed that the tractors will assist greatly in increasing the farm crop production in the Entente countries.

It also is announced that Ford hopes to have thousands of tractors ready for use in the United States and Canada by Aug. 1. The tractor plant and one of the motor car factories are placed at the disposal of the United States Government.

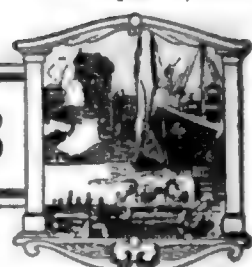
RATE RAISE TO HIT CARS

Washington, D. C., April 16—The Interstate Commerce Commission, which now has before it applications from practically every railroad in the country for permission to increase the freight tariffs from 5 to 15 per cent has not yet acted upon such applications except in a few instances, and these only with respect to certain articles of commerce as to western roads.

The expected advances, naturally will affect motor cars of all makes, and accessories very largely. The expected orders from the government for motor trucks and accessories probably will not come until after the increases in freight rates have become effective, if they do become effective, thus making it incumbent upon bidders for Government supplies to consider the possible increases in submitting their bids.



EDITORIAL PERSPECTIVES



Motor Car Work

RECENT war conditions make it imperative that the motor car industry furnish a great many men of technical ability to the government. Thousands of mechanics will be needed as drivers for motor truck convoys; for mechanics to assist these, and other thousands will be necessary as aviators and mechanics to assist aviators.

♦ ♦

THE Eastern division, representing the Atlantic seaboard, expects to require forty motor truck convoys of approximately thirty-three trucks each. This calls for more than 1300 drivers, who will be needed as soon as possible. It calls for a similar number of mechanics. Drivers of these vehicles, it is understood, will have the rank of sergeant.

♦ ♦

IF we raise an army of 1,000,000 men it will require approximately 40,000 motor trucks. This means 40,000 drivers and approximately 40,000 additional mechanics. These cannot all be taken from our motor car factories. We will have to conserve our working forces in the factories; otherwise our production will be cut down. Thousands of these mechanics must

come from service departments, garages and repair shops in all sections of the country.

♦ ♦

LOOKING at the aviation situation, almost an equal demand for intelligent mechanics confronts us. One airplane manufacturer has been asked to furnish 3000 trained aviators in approximately fifteen months. For each trained aviator, five skilled and well educated airplane mechanics are needed. This makes a total of 15,000 good mechanics necessary. An airplane mechanic must be a better educated and more skillful man than a motor car mechanic, as the airplane engine is a more sensitive powerplant than the motor car engine. It is more easily deranged and is harder to tune up. The ordinary mechanic will require a course of several months to fit himself for such work. These are but a few of the demands that an army of 1,000,000 men will make on our motor car industry.

♦ ♦

MEN from every city and every town in the country are needed for this work. It is just as important to have competent mechanics in the airplane and motor convoy works as it is to have men manning the artillery or in the ranks of the infantry. One is serving his country as well as the other.

Our Military Trucks

ISSUANCE by the War Department of specifications of 1½- and 3-ton military motor trucks as approved by the Society of Automobile Engineers is one of the latest indications of the importance of the motor truck to our systems of national defense. The War Department, after its experiences in Mexico last summer, reached the conclusion that a special military truck was necessary. The rough roads and the service to which the trucks were subject made it necessary to secure a more robust type of vehicle with more power than normally is necessary in commercial use. Our commercial trucks generally are operated on relatively well paved streets and on business schedules. In war the situation is different. The trucks must operate over good roads and bad roads; they must operate in good weather and bad weather; they must operate with light loads and with overloads; they must operate during the day and during the night; they must operate at higher speeds than our cities will permit; and often under circumstances which call for special stamina.

♦ ♦

THE specifications for the 1½- and 3-ton trucks, published elsewhere in this issue, have been drafted by the War Department and approved by the Society of Automobile Engineers with this special point in view. The engine is larger than that required in the average business truck, and there are

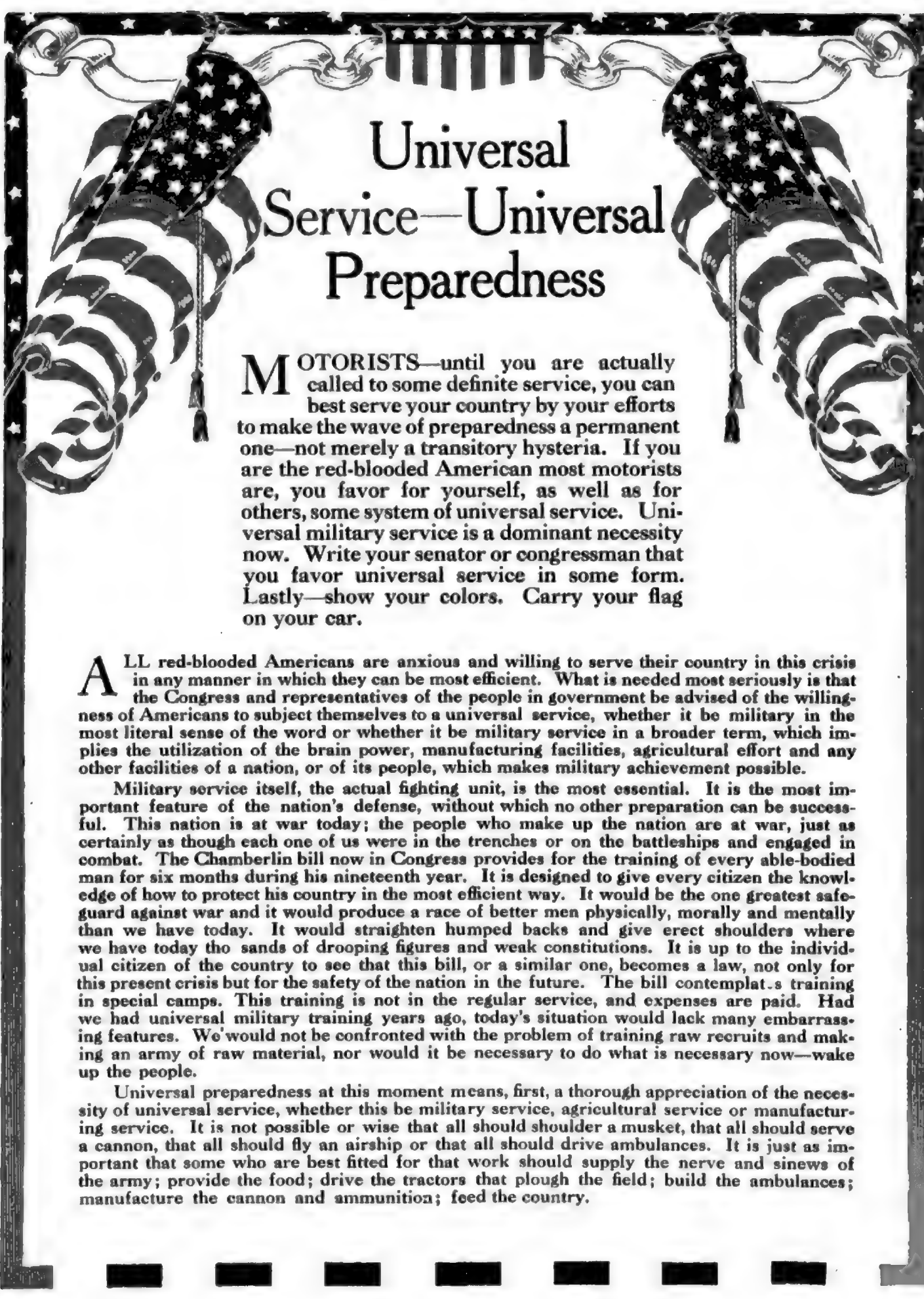
many other changes deemed necessary for this service, the four-speed transmission; maximum clearance; three-point suspension of the engine; three-point suspension of the gearbox, which must be a special unit; locking differential; alloy steel springs, and careful workmanship.

♦ ♦

THE War Department is to be congratulated on calling into conference with it the S.A.E. and endeavoring to draft specifications that will bring as little hardship as possible on the truck manufacturers and make it possible for truck manufacturers to bring out many motor trucks in the shortest possible time with the least possible expense. Originally, when the War Department began drafting these specifications, there were many minor engineering details that would have been very expensive for truck manufacturers. The majority of these have been eliminated so that the new trucks will be comparatively simple.

♦ ♦

COMPARED with some of the European truck specifications our military trucks are heavier, they have larger engines, lower speeds and other specifications which vary from European demands but which seem better because of the poorer condition of our highways and the greater distances to be covered in case of mobilization work.



Universal Service—Universal Preparedness

MOTORISTS—until you are actually called to some definite service, you can best serve your country by your efforts to make the wave of preparedness a permanent one—not merely a transitory hysteria. If you are the red-blooded American most motorists are, you favor for yourself, as well as for others, some system of universal service. Universal military service is a dominant necessity now. Write your senator or congressman that you favor universal service in some form. Lastly—show your colors. Carry your flag on your car.

ALL red-blooded Americans are anxious and willing to serve their country in this crisis in any manner in which they can be most efficient. What is needed most seriously is that the Congress and representatives of the people in government be advised of the willingness of Americans to subject themselves to a universal service, whether it be military in the most literal sense of the word or whether it be military service in a broader term, which implies the utilization of the brain power, manufacturing facilities, agricultural effort and any other facilities of a nation, or of its people, which makes military achievement possible.

Military service itself, the actual fighting unit, is the most essential. It is the most important feature of the nation's defense, without which no other preparation can be successful. This nation is at war today; the people who make up the nation are at war, just as certainly as though each one of us were in the trenches or on the battleships and engaged in combat. The Chamberlin bill now in Congress provides for the training of every able-bodied man for six months during his nineteenth year. It is designed to give every citizen the knowledge of how to protect his country in the most efficient way. It would be the one greatest safeguard against war and it would produce a race of better men physically, morally and mentally than we have today. It would straighten humped backs and give erect shoulders where we have today the sands of drooping figures and weak constitutions. It is up to the individual citizen of the country to see that this bill, or a similar one, becomes a law, not only for this present crisis but for the safety of the nation in the future. The bill contemplates training in special camps. This training is not in the regular service, and expenses are paid. Had we had universal military training years ago, today's situation would lack many embarrassing features. We would not be confronted with the problem of training raw recruits and making an army of raw material, nor would it be necessary to do what is necessary now—wake up the people.

Universal preparedness at this moment means, first, a thorough appreciation of the necessity of universal service, whether this be military service, agricultural service or manufacturing service. It is not possible or wise that all should shoulder a musket, that all should serve a cannon, that all should fly an airship or that all should drive ambulances. It is just as important that some who are best fitted for that work should supply the nerve and sinews of the army; provide the food; drive the tractors that plough the field; build the ambulances; manufacture the cannon and ammunition; feed the country.

N.A.C.C. Men for Board

Charles Clifton and John Willys
in National Industrial
Conference

Staff of Experts Will Investigate
Trade Problems

WASHINGTON, D. C., April 13—Charles Clifton, president of the National Automobile Chamber of Commerce and president of the Pierce-Arrow Motor Car Co., and John N. Willys, president of the Willys-Overland Co., will represent the motor industry on the National Industrial Conference Board, which is composed of national organizations of manufacturers.

The board was organized last May to consider matters affecting industrial development with a view to presenting to the public and to legislative bodies the business man's side of important questions. It includes sixteen national industrial associations.

Under the direction of the board a staff of experts has begun to investigate important industrial problems. The data collected and the conclusions and recommendations of the board based on them will be distributed widely through an official publication, copies of which will be placed at the disposal of representatives of the public charged with the making of laws which affect and regulate the conduct of industry. A digest and interpretation of current happenings in the industrial field also will be issued.

ERICKSON MAKES A TRUCK

Detroit, April 14—C. A. Erickson, former chief engineer of the Scripps-Booth Corp., is en route to Detroit from Warren, Pa., in a truck which he has designed, invented and manufactured, and which is driven through the front wheels. Mr. Erickson has been at work on the plans for more than eight years.

STEAM TRUCK FOR ARMY WORK

Detroit, April 14—The General Engineering Co. is completing a special design of the Doble steam powerplant for

use in trucks. The work is being hastened so that a finished truck may be submitted to the United States war department soon for tests.

Among the inquiries received from Government sources it has been asked if the Doble truck can be used with armored cars. Many advantages are claimed for the steam truck in army transport work. It is said that the cost per ton-mile is an exceedingly important factor and that through the use of kerosene Doble would effect a saving of about 25 per cent, and besides it is also possible to use other fuel if kerosene is not available. In fact, if it is found necessary to burn wood or coal, grates which are carried in the truck body may replace the usual combustion chamber. It is also claimed as an advantage that the Doble truck carries 50 per cent less of spare parts than the usual truck.

Details of the Doble truck powerplant are not yet available for publication. The engine is of a very different design from that used in the passenger car, and the weight is supported entirely by the frame. The drive will be through a 3 to 1 reduction at the differential, and the fan will be employed behind the radiator or condenser to insure perfect condensation. Just as in the touring car there will be no clutch or gear shift mechanism in the truck, which, it is claimed, decreases the complexity of the chassis and materially reduces its weight.

CRUDE OIL COSTS LESS

Austin, Tex., April 13—If the price of gasoline continues to be governed by the quantity of production and price of crude oil, a reduction may be expected soon. The credit balance quotations, or the prices paid for crude oil at the wells by the purchasing companies in the different districts when the same is not sold under contract, show slight decreases in prices, due, it is stated, to the increase of production. The daily output of the Gulf coast oil fields is now about 85,000 barrels, which is greater than at any time during the last two years. The prices paid for oil in these fields range from 90 cents to \$1.05 a barrel. The light crude oil of the North Texas fields is now selling for \$1.70 a barrel.

How Materials Soared

Elements in Steel Casting Manu-
facture Increase 100
Per Cent

Advance Covers Period of Two
Years—Other Rises Noted

CHICAGO, April 13—That the relative cost of the principal elements entering into the manufacture of steel castings increased over 100 per cent from Feb. 1, 1915, to Feb. 1, 1917, may be seen by a comparison of the list published below, furnished by the Swedish Crucible Steel Co., Detroit:

Pig iron—1915, \$18 per gross ton; 1917, \$55 per gross ton. Scrap iron—1915, \$10.50 per gross ton; 1917, \$20 per gross ton. Fuel oil—1915, \$3.25 per 100 gal.; 1917, \$12 per 100 gal. Manganese—1915, \$30 per gross ton; 1917, \$175 per gross ton. Ferrosilicon—1915, \$80 per gross ton; 1917, \$180 per gross ton. Fire brick—1915, \$28 per 1,000; 1917, \$45 per 1,000. Skilled labor—1915, \$3.50 per day; 1917, \$4.75 per day. Common labor—1915, \$2 per day; 1917, \$3 per day.

The greatest increase has been in the price of pig iron and oil, which have tripled in the 2 years, although the prices of the alloys, manganese and ferro silicon have felt an approximate increase of 100 per cent.

COLONEL K. C. PARDEE DIES

Chicago, April 13—Colonel E. C. Pardee, for many years prominent in the retail motor trade in New York, died at the home of his daughter, Mrs. Harry Ambler, here yesterday.

RUBBER MAKERS TO AID U. S.

New York, April 16—Special telegram—The advisory commission of the council of national defense has appointed a rubber committee, consisting of H. Stuart Hotchkiss, U. S. Rubber Co., chairman; Arthur H. Marks, B. F. Goodrich Co., and F. C. Hood, Hood Rubber Co. At a joint meeting of the executive committee and rubber advisory committee of the Rubber Association of America, Inc., a committee consisting of same men was unanimously appointed to represent the association and on its behalf to offer services to the government through the council of national defense. It was further voted that this committee co-operate with committees appointed by the council and report to the rubber association from time to time how members could best serve government.

TO PUSH USE OF ELECTRIC

New York, April 13—A conference of manufacturers of electric passenger and commercial vehicles, electric industrial trucks, batteries, tires and accessories will be held April 19 at the headquarters of the National Electric Light Association here. This meeting is called to pick a plan of definite co-operation between manufac-

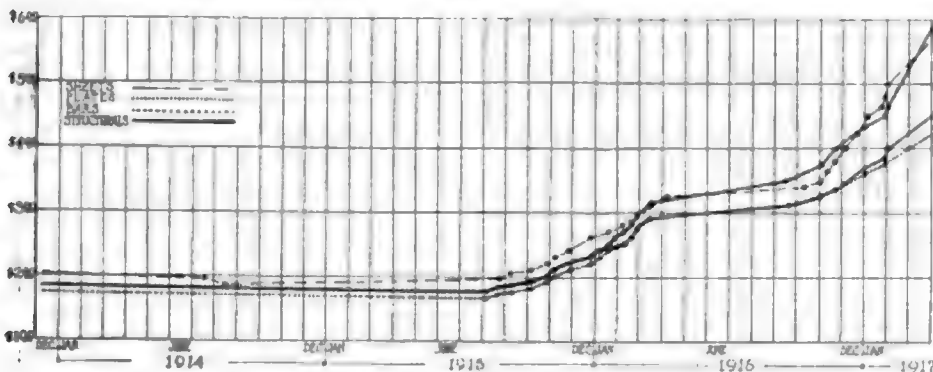


Diagram showing increase in price of steel sheets, plates, bars and structurals between Dec. 10, 1915, and Feb. 2, 1917

Labeling Fuel by Vapor Points Possible

U. S. Bureau of Standards May Advise Gasoline Marking—Dr. Burton, Oil Expert, Says Further Change in Quality Need Not Be Feared Soon

CHICAGO, April 16—Possibility of a federal law which will require the labeling of gasoline as determined by its evaporating qualities was the announcement of Dr. Robert C. Dickenson, physicist of the Bureau of Standards and Bureau of Mines, Washington, D. C., at the meeting of the Mid-West section Society of Automobile Engineers at the Chicago Automobile Club last night. Dr. Dickenson stated that these two government bureaus, of which he was the official representative at the meeting, had almost completed a standard specification for gasoline and probably would suggest the requirement that all gasoline should carry a label having two figures, one the temperature at which a certain proportion of the fuel, perhaps 20 per cent, will evaporate, and another at which perhaps 90 or 95 per cent will vaporize.

Carburetion from All Angles

This announcement was made during the discussion of the symposium on the fuel question, which was the feature of last night's meeting and was led by a paper, "The Fuel Question from the Driver's Standpoint," by F. O. Mock, engineer Stromberg Motor Devices Co., and which included authoritative statements from Doctor Burton, vice-president Standard Oil Co. of Indiana, on the fuel situation for the immediate future as well as the discussion of the efficient use of fuel from the engine manufacturer's standpoint by H. L. Horning, general manager Waukesha Engine Co.

The meeting, which was attended by 150 motor car, truck, tractor and oil engineers and their friends was preceded by a dinner at the Chicago Automobile Club, tendered by the Mid-West section to President Dunham and the Council of the Society of Automobile Engineers now in session in Chicago. At the dinner toastmaster Fred C. Glover of the Emerson-Brantingham Co., tractor maker, introduced President Dunham, whose message was that through the society the Government is planning to utilize S.A.E. members and that they would best serve their country at this time by awaiting their country's call through the society rather than in a burst of patriotism tie up their efforts in some line of service in which they would not be as useful as that planned for them.

This was brought out more in detail by General Manager Coker F. Clarkson, who told of the very close co-operation between the Government and the society in the mobilization of its factory and inventive organization resources and also of the very

successful way in which the society's census of its membership for war work is working out.

F. E. Moskovics of Nordyke & Marmon in a very stirring talk emphasized the need of increasing the membership of the society, stating that the work that the society is doing, particularly in means for the country's defense, is out of all proportion to its size; that every one of the 8000 men in the country who are eligible to the society are needed by the Government in the organization in which their best work can be done.

Chairman Utz of the standards committee told briefly of the co-operation between the Quartermaster's Department and the society which has resulted in the development of the standard specifications for army trucks detailed on other pages.

In the presentation of his paper Mr. Mock illustrated very forcibly the difference in vaporization of different grades of fuel. He arranged a manometer in which two grades of gasoline and one of kerosene were held under the same pressure by a mercury column and by heating these showed the variation in vaporization and how it affected the operation of an engine.

In the technical discussions which followed Mock's paper both Doctor Dickenson

and Mr. Horning took exception to Mock's statement that the vaporization points could not be taken as a good indication of the value of the gasoline for motor car use.

Herbert Chase, treasurer of the society, gave it as his opinion that more attention must be paid to developing engines for the use of heavier fuel.

Frederick Purdy, Findeisen & Kropf Mfg. Co., brought out the fact that motor car owners must be prepared to sacrifice some feature of car operation and that with present-day fuels and prospects for the future it would be impossible to expect coincident increases in acceleration, power and economy as we have had lately.

G. W. Smith, chief engineer Nash Motors Co., declared that the oft-mentioned difficulty of gasoline in the crankcase to a certain extent is an owner's question; that it is no hardship to ask the owner to change his lubricating oil every 1000 miles and that also we have reached the point where the chemists must get busy.

Mr. Glover then brought up the question of the use of alcohol and stated that until war conditions made it impossible, all of their tractors in Cuba were operating on alcohol, which was made by the individual sugar planters from their refuse at a cost of approximately 8 cents a gallon.

Burton of Standard Oil on Fuel Prospects

Written Discussion by Doctor W. M. Burton,

Vice-president, Standard Oil Co. of Indiana

MR. M. A. SMITH, Chairman of Meeting Committee, Mid-West Section, Society of Automobile Engineers,

Chicago, Ill.

My dear Mr. Smith:—

I have your letter of March 16, requesting that a representative of this company present a paper on "Automobile Fuels—Present and Future," which paper will be presented at the meeting of your Society on April 6.

Several papers, bearing on this most important subject, have been published recently in current periodicals. For example, in the March number of "Oildom," page 116, we find a somewhat extended article entitled "The Gasoline Situation Threatening." Also, in the February number of "Petroleum Age," page 2, we find an article by Charles V. Bacon, entitled "Gasoline—Analyses and Interpretation." Further, in the last issue of the "National Petroleum News," Dr. W. F. Rittman presents an article bearing upon the past and present of the gasoline situation, together with some predictions regarding the future.

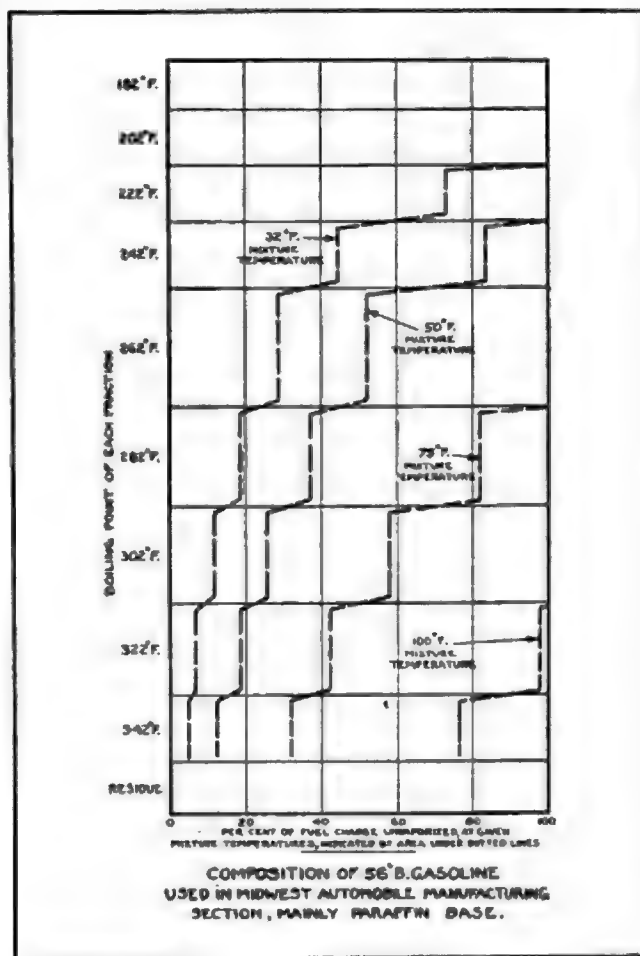
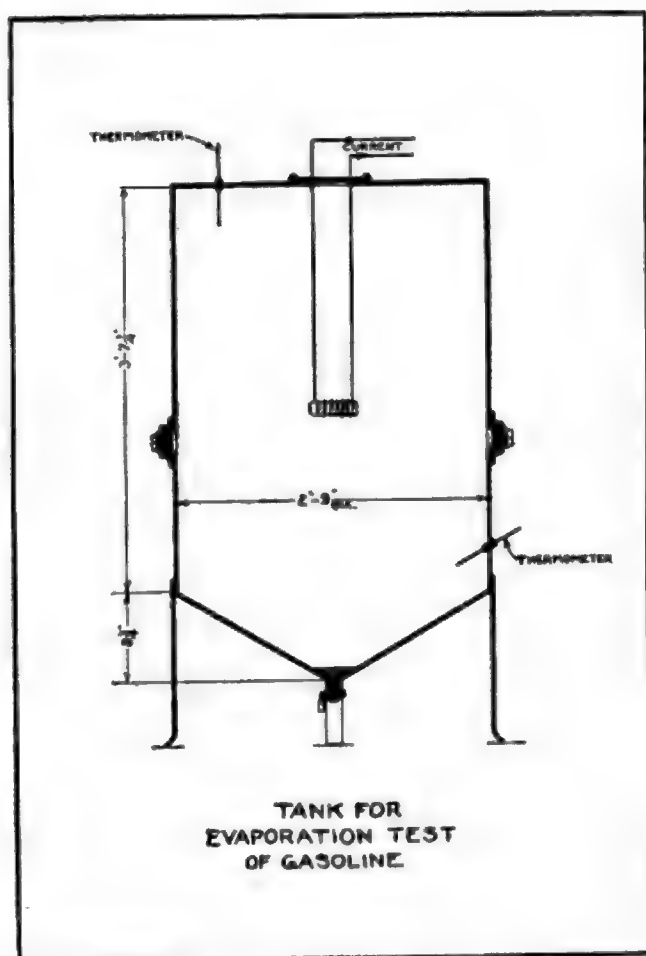
No doubt, the most of the members of the Society of Automobile Engineers have read these articles, and they appear to contain no extravagant statements, or statements that are not in harmony with the facts.

In Mr. Bacon's article, the writer describes

methods of making fractional distillations, which seem to be logical and would conform to the best methods accepted by the industry. He also describes experiences with twenty different samples of gasoline produced by as many different refiners and dealers. He has very little criticism to make of the quality of the gasoline being used, or of its behavior in internal combustion engines. I think it is the experience of every dealer in gasoline that a certain percentage of complaints may be expected from the users of motor vehicles. Defective ignition apparatus, or defective carbureters, or improper adjustments cause faulty workings of machines, and, in the majority of instances, the blame is all laid upon the gasoline, regardless of where the fault actually lies. I think, however, we may conclude that the bulk of the gasoline now used is reasonably satisfactory, that its quality in future probably will not change materially from that which is on the market at present, and that we may concern ourselves, principally, in the future, with regard to the supply of this indispensable fuel.

The pamphlet articles mentioned above, I think, show the situation quite clearly and there is little new material which I could offer. It might not be out of place, however, to offer a few statistics, with some comments as to future operations.

During the last 10 years, since the motor



six months of the year because they cannot handle the present fuel.

The fuel situation in the country as a whole is further confused, because of the variation in quality. In some localities the gasoline is as good as that used here fourteen years ago, in other places it is similar to that we used ten years ago, and the variation is so great that one single design of fuel intake system can rarely give good operation in all parts of the country.

Essential Properties of Motor Fuel

These differences in operation are not due to any deficiency in thermal energy, because all these gasolines have nearly the same calorific value, but rather to a deficiency in volatility, which interferes with the method by which they are delivered to the firing chamber of the motor.

The fuel situation in the country as a whole is further confused, because of the variation in quality. In some localities the gasoline is as good as that used here fourteen years ago, in other places it is similar to that we used ten years ago, and the variation is so great that one single design of fuel intake system can rarely give good operation in all parts of the country.

The force which drives the pistons of our motors is derived from the combustion of the oxygen of the air charge in combination with hydro-carbon vapor generated from the gasoline. The air is drawn into the cylinders by the suction stroke of the piston, from a common passage or manifold, while the gasoline is sprayed into this incoming air, at a chamber at the manifold entrance, which chamber we call the carburetor. Such parts of the gasoline as are sufficiently volatile, evaporate into vapor and enter the cylinder along with the air. These volatile parts composed about 100 per cent of the early gasoline, but this percentage has diminished until now, with our Mid-West fuels, about 40 per cent can evap-

orate under the present average operating temperatures.

What becomes of the unevaporated part of the gasoline depends on the velocity of the air carrying it, also upon the nature of the path which the air must travel; and, to a slight degree, upon the fineness of atomization of the gasoline drops. When the drops are small and the air velocity about twenty feet per second, the drops are carried in suspension along with the air so that the effect is practically the same as if the gasoline were evaporated. When the velocity is lower than this, it is much easier for the drops to fall out and this collection or condensation is facilitated when there is a tee bend, or an elbow, as the gasoline particles naturally proceed in their initial direction of motion until forcibly deflected from it by the wall on which they strike. As soon as the drops strike the wetted wall they are subject to surface tension and from then on they cling to the wall of the intake manifold and pass along in a stream. If the air velocity is sufficiently high at the bend, about fifty feet per second, it will wipe much of this liquid part off the walls again and carry it along with the air.

What Gasoline Actually Is

Whenever the gasoline is carried in suspension with the air, it is easy to get good operation with any of our gasoline fuels. It is when the gasoline is not carried by the air that we have our trouble. For motors which run at a constant speed it is easy to design the intake manifold to have the requisite air velocity at that speed. With a motor car engine, however, the air velocity at the highest speed is approximately twenty times that at idle, and it is impossible to select an intake manifold size which will be equally efficient under all conditions.

"Gasoline" is not a liquid of fixed and inflexible composition like water or benzol,

but is more nearly a trade name applied to whatever components, obtained in the refinement of crude petroleum, as are deemed possible to use as a motor car fuel. The crude petroleum in different parts of the world are very greatly different and this difference extends to the composition of the gasolines derived from them. For instance, our Eastern Pennsylvania gasolines are supposed to contain mainly hydro-carbon elements of the hexane series, C_n, H_{2n+2} . The gasolines found in the West and South contain elements of the following different series, $C_n, H_n, C_n, H_{2n-2}, C_n, H_{2n-4}$, as well as many others. When the heavier products are "cracked" to make lighter ones, still further variety is found. All these, however, are capable of complete combustion in an automobile motor if properly vaporized, and further have nearly the same number of B. T. U. per pound.

On account of the extreme difficulty of accurate chemical analysis it is common to judge the composition of these fuels by the process of progressive distillation. A measured quantity of the gasoline to be tested is put into a flask and heated. As the temperature rises a point is reached where the liquid begins to boil. The boiling continues, with nearly stationary temperature, until all of the elements which boil at that temperature have been converted into vapor, which is conducted away from the flask and collected in a condenser where the quantity may be measured. If the temperature then is raised, another boiling point will be found, that portion distilled off and so on.

The three charts herewith show the proportions distilled off at different temperatures in three samples which are typical of the fuel commonly used in different sections of this country. The diagrams have been made in such a form that they may be conceived as representing what would happen in a barrel

of gasoline if it were possible to separate the element according to gravity. The lighter elements are at the top, the lower ones at the bottom and the included area represents the relative volume of each present. It will be noticed that the eastern gasoline and the mid-west gasoline are quite closely graded as to the percentage of each element present, while the western gasoline contains an extremely large percentage of the one element which boils at about 280 deg. F.

I might state that the exact boiling point, and the exact proportion boiling off at each temperature are very difficult to measure because the values obtained vary greatly according to the speed with which the distillation is conducted, the nature of the apparatus, and so on. In making these distillations we endeavored to rise from one boiling point to another as quickly as possible, but held the boiling points.

With regard to the operation of the motor car under these different fuels, I would say that a carburetor adjusted for mid-west gasoline would perform practically perfect with 73 deg. eastern gasoline. For some reason the western gasoline (I understand that the Texas and southwestern gasoline is about the same as this) does not operate nearly as well and requires an entirely different carburetor adjustment.

Evaporation Effected by Throttle Position

The percentage of gasoline evaporated and its rate of evaporation further depend greatly upon the position of the throttle, or, more specifically, vary closely with the vacuum in the intake manifold. As a result there is little trouble from failure of the gasoline to evaporate at closed throttle. This fact, in conjunction with the preceding one, gives the reason why we have difficulty handling our present day heavy fuels at wide open throttle and low air velocity. This has been helped to a certain degree by preheating the air

charge or by heating the intake manifold, but the heavy elements introduced in the gasoline in the last few years are so non-volatile that their complete evaporation requires heating the manifold and entering air above the boiling point of water, and to so high a temperature that the amount of air charge, and consequent power of the engine, are perceptibly reduced.

Necessity for Compromise in Motor Design

We recently made some experiments by directing an atomized supply of gasoline into a bent elbow, through which air was being drawn, and noting the condition of the mixture issuing from the elbow when the elbow was heated at different temperatures. Though the spray was very fine indeed, so that it would change into a mist and then disappear when the spray jet was directed into the air of the room, in the elbow the action was very bad. The gasoline would strike on the far wall of the bend and drain back out of the elbow in a steady stream, while only a few particles would issue from the mouth of the elbow. This was at temperatures of the elbow from 70 deg. to about 220 deg., with the entering air about 70 deg. When the elbow was heated to about 250 deg., conditions were somewhat better, as about two-thirds of the gasoline drops seemed to make the bend without condensing on the wall and there was consequently less "loading" in the elbow. When the elbow was heated to 310 deg. F. there was no condensation whatsoever and the gasoline came out of the elbow in a white smoke or dry fog.

In developing a motor car engine of the type used today it seems necessary, for the use of fuel no heavier than that we now have, to choose some sort of compromise among the following:

1—Restricting the torque at high speeds by a small intake manifold; or

2—Heating the charge so much that the power is reduced; or

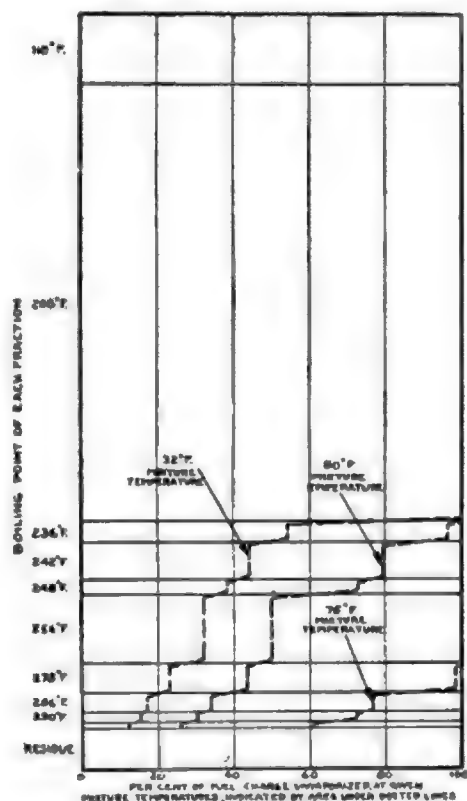
3—Reducing the range of operation (i. e., providing a range of operation of 5 to 45 miles per hour at wide open throttle instead of from 1 to 60); or

4—Using light gasoline, which is now expensive, and will speedily become more so.

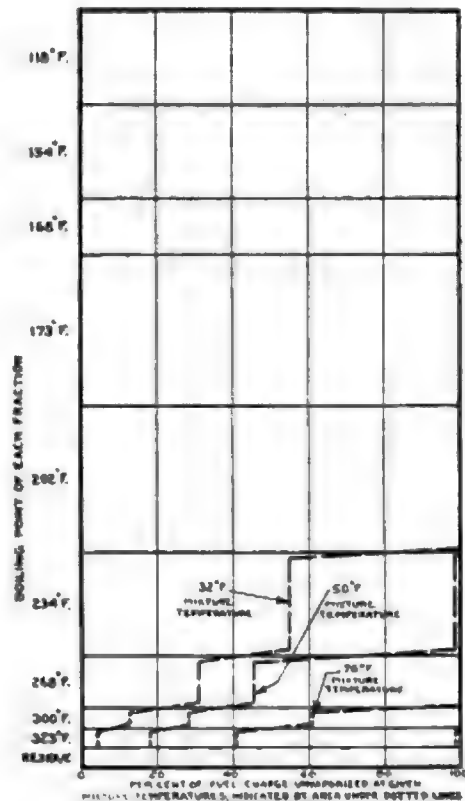
Just here is where it is of value to consider the subject from the driver's viewpoint. A number of engineers would rather do anything else than sacrifice their maximum power per cubic inch piston displacement, which it should be noted is not a satisfactory rating of the power of the motor in the car, because it applies to but one speed, and that one seldom used. This "maximum power" is extremely different from the maximum power the driver knows, which is usually gauged in the way it is most usually employed, by the torque available for acceleration, at ordinary driving speeds. The motorist also objects to paying a high price for gasoline, or having to go to special filling stations to get a particular kind. I further believe that the average man is willing to shift gears when it is necessary to pull through sand or climb a hill below 7 miles per hour, in fact, he should do so for mechanical considerations alone. To practically every motorist it is of much more importance than many well-known mechanical talking points, that a car should warm up to a temperature of good running in a few blocks, yet how few are the cars that will do this. There are many similarly logical reasons why, with the fuel situation as it is, we should be prepared to yield some standards of performance in order to realize certain other standards of economical and convenient operation.

Heavier Fuels

There is a large public demand for the use and utilization of even heavier fuels than the gasoline we now have, and this must be at-



COMPOSITION OF 60° B. GASOLINE
ASPHALT BASE - FROM CALIFORNIA DISTRICT



COMPOSITION OF 72° B. STRAIGHT GASOLINE
PARAFFIN BASE - FROM PENNSYLVANIA DISTRICT

tained if motor fuel is to continue at its present price in years to come. Until a very short time ago we have not seen in operation any system which would use kerosene, for instance, without so many disadvantages that it gave no promise, for motor car use. In fact kerosene is scarcely satisfactory on motors of constant speed, where there is no limitation as to intake air velocity or as to the amount of heat available. We have recently found that by following a cycle whereby the kerosene is vaporized at a very high temperature, and then mixed with a charge of air at low temperature, that the resulting fog may be kept in complete suspension in the air stream and this should therefore do away with the troubles above described, so far as they relate to conduction of the fuel to the cylinder. There remains the further difficulty of obtaining a vapor in the cylinders, so that the spark can propagate away from the spark plug points, but this can probably be overcome by using a blend, as by mixing the kerosene with some of the elements now found in gasoline; this is also desirable as a step toward economical use of our fuel resources, because such a fuel corresponds more nearly with the composition of the natural petroleum product.

TO AID UNCLE SAM

York, Pa., April 14—Motorists from this city and York county attended the meeting of the International Motor Club Association held in Philadelphia last week to form plans to render service to the Government. The organization is making an effort to obtain 1000 motorists in the Philadelphia district, who will offer their cars to the government. The York branch of the Red Cross and the York county committee for public safety, Grier Hersh, chairman, are tabulating motor vehicles in this city and county, with their drivers, for use for humane and defense purposes.

Fourteen taxicab drivers of York have offered their services to the United States and, in a communication sent to Mayor E. S. Hugentugler, pledged themselves to respond to the call of President Wilson.

"1916 AUTOMOBILE CONTESTS"

"1916 Automobile Contests" is the title of a booklet issued by the contest board of the American Automobile Association. It gives the results of all motor car contests held in 1916 under the rules and with the sanction of the A.A.A. and is compiled from the official records in the office of the contest board by W. Harvey Trauband, Jr., and T. B. Shoemaker.

The booklet gives the list of registered drivers, mechanics, racing cars and stock cars for 1916, also the licensed tracks and speedways.

Copies of the book may be obtained from the contest board of the A.A.A., 501 Fifth avenue, New York. Price, 50 cents.

DURANT IN MEETING

Saginaw, Mich., April 16—A conference was held here late last week which was attended by W. C. Durant, W. L. Day, F. A. Whetten, M. L. Darton, W. W. Murphy and George Hannun. It is believed that this conference had to do with old Marquette plant. Nothing definite could be learned.

Car's Bit in War Fund

McAdoo Would Use Motor Vehicle Tax to Meet Expenditures

Fords and Overlands Would Pay \$3,000,000

Washington, D. C., April 17—Special telegram—Secretary of the Treasury William G. McAdoo in his statement to Congress making recommendations as to the raising of money with which to meet the war debt of \$7,000,000,000, includes motor vehicles as articles for taxation and suggests rates as follows:

Cars Selling for	Rate
Less than \$500.....	\$1
\$500 to \$750.....	2
\$750 to \$1000.....	3
\$1000 to \$1500.....	5
\$1500 to \$2000.....	7.50
\$2000 and over.....	10

Looking at this tax, if it is to be applied to each car in use, Ford owners would contribute about \$2,000,000 to the fund, while Overlands would add another \$1,000,000. Here is how some of the production figures for 1916 would bring revenue to the Government under this new form of taxation:

Car	Production	Price	Tax
Hudson.....	25,000	\$1500	\$ 125,000
Reo.....	25,000	1000	75,000
Oldsmobile.....	12,000	1500	60,000
Packard.....	8,000	3000	80,000
Cadillac.....	20,000	2000	140,000
Studebaker.....	70,000	1000	210,000
Buick.....	70,000	1000	210,000
Chalmers.....	25,000	1750	175,000
Chandler.....	30,000	1200	150,000
Dodge.....	70,000	800	210,000
Maxwell.....	70,000	750	140,000
Oakland.....	25,000	1200	125,000
Overland.....	140,000	1000	420,000
P Paige.....	10,000	1200	50,000
Ford.....	508,000	350	500,000

Total.....\$2,670,000

In providing that if the present excess profits tax of 8 per cent on corporation and partnership profits on more than \$5,000 and 8 per cent of invested capital were made applicable to the calendar year 1916, or made retroactive, the Secretary estimates it would yield \$226,000,000. He would give corporations and partnerships, however, until September next to pay the tax.

AERO SQUADRON IS PLANNED

Indianapolis, Ind., April 14—W. E. Stalnaker, vice-president and director of sales of the Pathfinder Co., has offered his services to Harry B. Smith, adjutant general, in recruiting and organizing an aero squadron of 168 officers and men. The decision of the adjutant general is waiting on a reply from the war department, as there is no authority to organize an aero company.

N. Y. CLASS JOURNALS TO AID

New York, April 16—Special telegram—The following resolution was unanimously adopted at the editorial conference here to-day: "The members of the editorial conference of the class journals of New York City here assembled are glad to re-

spond to President Wilson's appeal in his proclamation of April 15 and will do all in their power to lead and inspire the industries they represent to render that patriotic service to the nation which the president has requested."

B. V. Wright, editor of the Railway Age Gazette, emphasized the necessity for getting men and supplies to the seaboard for war purposes and pointed out the overwhelming burden which the Adamson Fullcrew Law, the higher taxes, wages, coal and steel prices are imposing on the railway industry.

J. H. Vandeventer, of the American Machinist, reviewed the importance of machine shops and factories in war work especially in furnishing ammunition, stating the government facilities could not produce one-tenth of amount needed. Shells requiring over 5 hr. apiece to make are fired are fired at rate of twenty a minute in French seventy-fives.

BUILDS 1000 CARS IN MARCH

St. Louis, Mo., April 13—The Chevrolet Motor Co. of St. Louis constructed 1000 motor cars in March. This large order was rushed through in response to a demand from New York for 1000 cars to be delivered April 2.

GASOLINE WAR RISE EXPECTED

New York, April 14—Gasoline prices are expected to rise soon irrespective of what effect the war may have on Government purchases. Domestic consumption of gasoline is not yet under the influences that operate during the later spring and summer months, when the use of gasoline for touring will be at its greatest. However, it is expected that there will be a large increase in the consumption this year, while a further expansion of the gasoline output is problematical, practically assuring higher prices.

ST. LOUIS CLUB VOLUNTEERS

St. Louis, Mo., April 16—The Automobile Club of St. Louis has offered to the Government the services of 5000 cars belonging to members of the club and of 3000 members. The offer was made through President E. M. Flesch following a meeting of the Board of Governors who had been asked to canvass the membership on this question.

GOVERNMENT BUYING STEEL

Detroit, April 16—The government continues to place large contracts for steel for the construction of ships, munition plants and army and navy equipments. Fully 100,000 tons will be required by the navy department in addition to the 3,000,000 tons of structural steel contracted for last week.

Railroad demands on the steel mills are light, orders for rails since April 1 amounted only to 60,000 tons, and car contracts have called for only 50,000 tons, while locomotive builders have taken orders for but 120 engines.

Results of Traffic Education

Kansas City Pedestrians Learn to Walk

EDUCATIONAL work can accomplish quite as much as laws can, to secure safety and convenience. Most people want to do what is right, if they only know what it is.

Kansas City, Mo., offers a shining example of the results of educational work in behalf of traffic safety. Long before there was an adequate traffic ordinance, the local safety council, and especially the Kansas City Railways Co., was quietly educating the public on the subject of taking care of itself and looking out for others. The street railway company had sent a man to every public school with an illustrated lecture on safety. He has talked and shown his moving pictures to 45,000 school children, and has talked to more than 7,000 parents and teachers.

Children Educated

Here is the comment of the superintendent of a motor car training school, on the results of that educational campaign:

"We do not have any trouble at all with children getting in the way now; it is the grown folks only that we have to watch out for. Why, even I have got into the habit, at my corner, of crossing the streets when the kids do, for they are always watching to left and right, and avoiding motor cars and street cars. They wait until the coast is clear, and then keep going until they reach the other side."

The children have been thoroughly drilled in the idea that it is a crime to cross a street in the middle of the block. W. B. Woodland, supervisor of safety for the railways company, told a joke on himself in this connection. He said he inadvertently crossed in the middle of the block downtown, and as he reached the curb, a boy shouted at him, "Hey, mister, why don't you practice what you preach?"

Another phase of the educational work of the railways company, is its co-operation with the team and truck owners, especially the large institutions that run many trucks. The company sends bulletins bearing suggestions on proper driving on city streets, which were posted in all garages and stables, and it is notifying any firm whose driver is guilty of an infraction of a traffic rule, or of improper driving. The firms have expressed the greatest appreciation of this co-operation, for they are enabled to bring their careless drivers to time.

The manager of a motor car repair plant in Kansas City had the following to say on this phase of safety work:

"We have lost about 50 per cent of our 'haul-in' business in the last year. For some reason or other there are not nearly so many accidents as there used to be. It

is very plain that drivers of wagons and trucks are growing more careful, and despite the very large increase in the number of machines on the streets, the collisions are declining."

The railways company is continuing and expanding this campaign of education. It is worth noting that its suggestions are by no means confined to advice which will reduce the number of collisions with street cars; indeed, most of the work it does merely reduces the number of possible accidents in which the company would not be liable anyway. The object of the company is to make traffic safer on Kansas City streets, and it will get its share in the general improvement.

The local safety council has recently formed a public safety division, which will

Tagging the Violator

A systematic plan of dealing with motorists violating traffic regulations has been put into effect by Chief of Police Bushong of Lancaster, Pa. The policemen have been provided with red tags and upon discovery of any violation of the traffic regulations hands one of these tags to the motorist, or if the car has been left standing somewhere, and the officer does not find it convenient to hunt up the driver, then the tag is tied to the steering gear of the machine. A coupon attached to the tag is torn off by the officer and turned in to the chief. If the officer has seen the motorist he secures the number of his license, his name and address and places the information on the coupon. If he does not get this information he simply gets the number of the machine. The violations include speeding, driving without license, excessive use of muffler cutout, violating parking ordinance, obstructing fire plug, lights not dimmed, lights not burning and disregarding police signals.

SALT LAKE FIXES SPEED LIMIT

Salt Lake City, Utah, April 14—Under the new Utah state law which does away with "reasonable speed limits" and allows municipalities to fix their speed limits, the city of Salt Lake has under consideration a revised traffic ordinance. During the period of "reasonable speed" the justices and police court judges have fined motorists who drove faster than 25 m. p. h. in the uncongested districts. The new ordinance, in the hands of the city attorney, would cut this to 20 m. p. h. and make the limit 8 miles across intersections, 15 miles in the congested business districts and turning corners, 12 m. p. h.

broaden the educational work already under way. Safety patrols will probably be organized in the schools, to look especially after the crossing of streets near schools. There are some of these patrols now—and they get far better results in controlling the children than do policemen stationed near the schools.

The coming generation in Kansas City is being raised with the knowledge of how to take care of itself, on the public streets.

PENALTY TO FIT CRIME

The thought is advanced by Osborne L. Yelliot, chairman of the American Automobile Association legislative board, that in designing traffic laws, certain rights of the motorist should be observed and to that end says:

"Every person employing a vehicle which may cause injury to others, unless reasonable care is used, should be compelled by positive provisions of the law, rigidly enforced, to employ a degree of care commensurate with the risk involved to others under each particular condition which may arise. At the same time he should not be bound down or hampered by minute restrictions not reasonably necessary for the protection of other highway users."

Rules to Be Sane

"For these reasons, fixed speed limits and other similar arbitrary requirements are omitted from our rules and for them the association has substituted a series of rules of the road in the more important of which are provided, in effect, that whenever there is reason to apprehend injury to others, the person in charge of the vehicle shall take especial precautions to see that such injury does not occur. Under this theory each situation which arises must make its own law. That law is: 'whenever there is danger of accident you must avoid it.'

"It must follow that the enforcement of the law should be rational. The provisions relating to arrest, bail, trial and appeal should provide for the prompt apprehension and punishment of offenders, but at the same time should be framed with due regard to the fact that the great majority of violators of our road-traffic laws are not in the same category with common thieves, pickpockets, burglars, murderers, etc. Therefore special facilities should be afforded for the prompt disposition of such cases without unreasonable hardship to the offenders."

Mr. Yelliot would graduate the penalty according to the offense so that where the offense is merely technical in nature the fine would be nominal.

little more than a solidly built, muscular, well-proportioned animal. A horse that is well-proportioned and well-balanced is the ideal of a hunter-jumper. The horse that is well-proportioned and well-balanced is the ideal of a hunter-jumper. The horse that is well-proportioned and well-balanced is the ideal of a hunter-jumper.

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THE HUNTER-JUMPER IS A HORSE THAT IS WELL-PROPORTIONED AND WELL-BALANCED

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To Auction Sheepfold Bay Speedway

Proceeds Sale May 1 Probably Will Not End Racing There, However

THE SHEPHEPOLD BAY SPEEDWAY, a 1.5-mile track in the heart of the town of Sheepfold Bay, is being sold by the town of Sheepfold Bay. The track is being sold by the town of Sheepfold Bay. The track is being sold by the town of Sheepfold Bay. The track is being sold by the town of Sheepfold Bay. The track is being sold by the town of Sheepfold Bay.

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War News in Brief

New York, April 13 — George Allan Green, chief engineer and superintendent of the Fifth Avenue Coach Co., which operates about 200 motor buses in New York, has sailed for France to take the captaincy of a corps of armored tanks on the Somme front. The British government offered Mr. Green the appointment because of his thorough knowledge of Knight sleeve-valve engines, which are used in British tanks.

As engineer of the Fifth Avenue Coach Co. Mr. Green has had much experience with this type of engine, his company having bought 250 Moline-Knight engines for use in Fifth avenue buses. Before his connection with the New York concern Mr. Green was superintendent of the London General Omnibus Co. He has been in various engineering positions connected with transportation for nineteen years, fourteen of which had to do with design, construction and operation of gas-propelled vehicles. With the Fifth Avenue Coach Co. Mr. Green reduced the cost per mile of operation more than 100 per cent. One of his recent activities was that of developing a complete snow-removal system for the company, by which it removes snow from more than 30 miles of New York streets, on which the buses operate, without interfering with the regular schedule.

St. Louis, Mo., April 16—The Wagner Electric Co., manufacturer of motor car starters, has offered the Government use of the plant which was used for the manufacture of big shells for the Allied countries. This order was completed about a week ago, and the plant so used is being held in readiness for any service the Government may wish.

San Francisco, Cal., April 13—Eighty-five members of the tenth company, coast artillery corps, made a record run from San Francisco to Half Moon Bay to repel an imaginary invasion from the sea. The run was made in 1 hr. and 20 min. in twenty motor cars and two trucks, all of which were Studebakers. The military observer on the test run called it a most satisfactory demonstration. The length of the run was 39½ miles.

Benton Harbor, Mich., April 13—Among the offers being made by various concerns in the motor industry to help in the preparations for war is that of the Climax Shock Absorber Co., Benton Harbor, Mich. It has announced that it will contribute 20 per cent to the Red Cross or other approved fund on every set of Climax shock absorbers sold by it to car owners on or before June 30. The shock absorbers sell at \$25 a set, and at present the company is selling them direct to the owner on a trial and money-back basis if not satisfac-

tory. The officers are President, William A. Vawter; vice-president, John Steiner; secretary, Frank E. Coombs; treasurer, William A. Vawter, II; and general manager, I. W. R. Tennant.

LARGE CLASS PUBLICATIONS PLEDGE WAR SERVICES

EXECUTIVE OFFICES UNITED PUBLISHERS CORP., 243 WEST
THIRTY-NINTH ST.,
NEW YORK

April 10, 1917.

Mr. Grosvenor B. Clarkson,
Secretary of The Council of National
Defense,

Washington.

Dear Sir:

After consultation with our board of directors, the United Publishers Corp. has decided to offer to all departments of the United States Government the absolute co-operation of our industrial publications covering many leading industries of this country, both in the matter of editorial co-operation and the free use of advertising space, for the purpose of assisting the Government in the mobilization of our industries, publicity in methods of finance and the promotion of any project undertaken by the Government during the present condition of war.

We cover the iron, steel and machinery industries through the Iron Age and Hardware Age, New York.

The automobiles and motor truck industry through the

Automobile.....New York
MOTOR AGE.....Chicago
Commercial Vehicle.....New York
Motor World.....New York

The shoe industry through the
Boot & Shoe Recorder of Boston.

The building industry through the
American Architect.....New York
Building Age.....New York
Metal Worker.....New York

The dry goods field through the
Dry Goods Economist.....New York
Dry Goods Reporter.....Chicago
Drygoodsman.....St. Louis
Pacific Coast Merchant.....San Francisco

We shall seek to interest the active co-operation of these important business interests in their local centers, and shall hope to especially assist in placing the bond issue without expense to the Government.

In any of these matters your commands will receive our prompt and immediate attention.

Yours very truly,

H. M. SWETLAND,

President.

Washington, D. C., April 13—If plans now perfected by the higher officers of the quartermaster's corps of the army can be carried out, the only thing standing in the way being the granting by congress of an appropriation of \$100,000 already asked for, a large motor car plant will be established in connection with the Jeffersonville, Ind., quartermaster's depot. The appropriation asked is for additions to the present plant, for the building of which there is plenty of room on the reservation.

Brigadier General Cruse of the quartermaster's corps is taking a personal interest in the plan. He states that if the motor car plant is erected, it will take care not only of the many machines, principally trucks, which the army soon will need, but it can be used to build the bodies for all army trucks, these now being built under contract for the Government.

In addition, the plan is to use this plant for the repair of trucks sent in from the field and the practical building of trucks should this be necessary in an emergency.

Chicopee Falls, Mass., April 14 — The Fisk Tire Co. has notified the U. S. Government officials that if they decide to establish a mobilization camp near Springfield it will turn over to them the 45-acre athletic field owned by the company here which would make an ideal spot for such purposes. The Government officials have taken the matter under advisement.

Philadelphia, Pa., April 14—At a joint meeting of the Automobile Trade Association and the Motor Truck Association of Philadelphia on April 10 twenty-five firms pledged themselves to contribute fifty-eight motor cars and trucks to the services of the United States in the war. For this purpose both associations are acting in concert with the Home Defense Reserve. A committee was appointed to formulate plans for the organization and operation of the fleet.

Indianapolis, Ind., April 16—Use of the Indianapolis Motor Speedway as a training station for army aviators is now practically assured. James A. Allison, secretary and treasurer, last week received a letter from the War Department asking when it would be convenient for army officers to inspect the grounds. Mr. Allison replied that the grounds could be inspected at any time and that he would hold himself in readiness to fulfill the promise of the speedway management to turn the property over to the Government to start a training station for aviators. Captain Morrow in charge of aviation in this district and with headquarters in Chicago has inspected the plant and it is understood will report favorably upon it.

Results of Battery Neglect

How to Put Off the Day When a New Battery Must Be Bought—When Lack of Care Sometimes Causes

Ignition is essential to any automobile. Without it, the car is useless. Ignition is the spark that starts the engine. It is the spark that keeps the car going. Without it, the car is useless. Ignition is the spark that starts the engine. It is the spark that keeps the car going. Without it, the car is useless.

But, for many reasons, it is not always easy to keep the spark going. One of the most common causes of ignition trouble is a weak battery. A weak battery cannot provide enough power to the ignition system. This can result in a car that starts with a jump or a car that stalls. A weak battery can also cause the engine to run poorly. This can result in a car that is difficult to drive. A weak battery can also cause the engine to overheat. This can result in a car that is unsafe to drive.

There are many things you can do to keep your battery in good condition. One of the most important things is to check the battery regularly. This includes checking the electrolyte level and the state of charge. It also includes checking the terminals for corrosion. By taking these steps, you can help to prevent battery problems and keep your car running smoothly.

By J. H. HANCOCK, Manager



Check battery for state of charge. Insure electrolyte level is correct.

Always battery, whether it is a new one or an old one, should be checked for state of charge. This is done by testing the battery with a hydrometer. The hydrometer measures the specific gravity of the electrolyte. A reading of 1.265 or higher indicates a fully charged battery. A reading of 1.200 or lower indicates a weak battery.

The hydrometer should be used on a fully charged battery. If the battery is weak, the reading will be low. A low reading indicates that the battery needs to be recharged or replaced.

One of the reasons that the battery is so important to the car is that it provides the power to start the engine. Without a good battery, the car will not start. This is why it is so important to keep the battery in good condition. A weak battery can cause a lot of trouble for the car owner. It can prevent the car from starting, and it can cause the engine to run poorly. A weak battery can also cause the engine to overheat. This can result in a car that is unsafe to drive.

There are two main ways to keep the battery in good condition. The first way is to check the battery regularly. This includes checking the electrolyte level and the state of charge. The second way is to keep the battery clean. This includes cleaning the terminals and the battery case.

By checking the battery regularly, you can catch problems before they become serious. This can help to prevent a lot of trouble for the car owner. By keeping the battery clean, you can help to prevent corrosion and other problems. This can also help to keep the battery in good condition. By taking these steps, you can help to keep your car running smoothly and safely.

There are many other things you can do to keep your car in good condition. This includes checking the oil, the tires, and the brakes. By taking these steps, you can help to keep your car running smoothly and safely. This can help to prevent a lot of trouble for the car owner.



Left, 6-volt battery; right, 12-volt battery. Both are of the same type, but the 12-volt battery is larger and has more terminals.

Circling the White Mountains

America's Switzerland Has Superb Attractions

INNUMERABLE points of historic and scenic interest that in many ways are without equal in this country place New Hampshire in the front rank of the favorite touring sections of the United States. Even long before motor cars furnished the principal means of travel over the roads, this district was thronged with tourists from all parts of the country every year, and discerning visitors from other lands made a point of including "The Switzerland of America" in their itineraries.

Especially rich in scenic attractions, the White Mountains, which lie wholly within the state of New Hampshire, imbue the visitor with a desire to explore every vale and crag that every bit of beauty and grandeur may be put on the canvas of memory. These mountains are a part of the Appalachian range and extend from Plymouth on the south to Groveton on the north. The western portion of the range is called the Franconia mountains and the central group, including Mount Washington, is called the Presidential range from the fact that its various peaks are named after the early presidents.

Bretton Woods the Terminus

Bretton Woods is made the terminus of nearly all the routes entering this section, solely as a matter of convenience and on account of its central location. However, Crawford House, Twin Mountain, Jefferson, Jackson, Gorham, Intervale, the Woodstocks, Franconia, Bethlehem, and last, yet preferred by many, the Profile House, share equally in advantages as a tourist center.

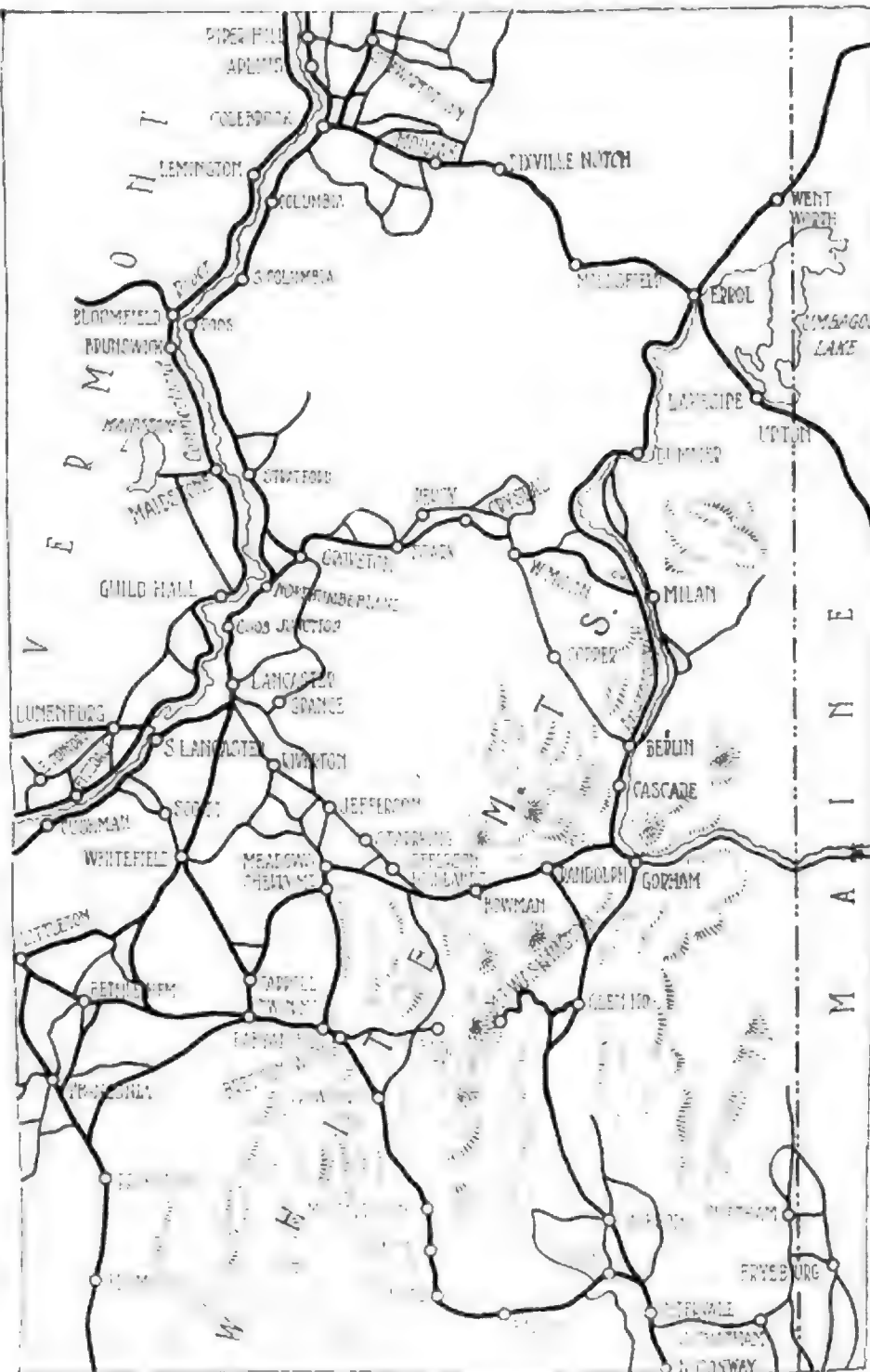
Much of the White Mountain district can be made in one circle tour. If the tourist is in the vicinity of Boston he would enter the district at North Conway and drive on through Intervale to Jackson, which is surrounded by the outlying spurs of the mountains. Several days may well be spent in the vicinity of Jackson if all the sequestered beauty spots are to be visited. Fishing and golfing are the principal sports at this point. From Jackson north the road follows the winding course of the Ellis river. Some distance to the north of Jackson the road leading to the top of Mount Washington branches off and here is a climb of 6000 or 7000 ft. that offers superb attractions. It should not be forgotten, however, that warm wraps are necessary for these mountain tours, even in midsummer, to guard against the chilly atmosphere of the higher levels where the temperature seldom rises above 50 deg. and the cold mountain mists sometimes cause discomfort.

Going north from the point where the Mount Washington road branches off, the road follows the Peabody river and is over-

shadowed by massive summits of the Presidential range—Mount Washington, Mount Clay, Mount Jefferson, perhaps the finest of all the White Mountains in its perfection of form and grandeur of outline, the three Adams peaks and Mount Madison. The road then circles the bulky form of Pine Mountain toward Gorham on the An-

droscoggin river. A short distance to the west of Gorham the Moose river is crossed and the road then leads up the picturesque Androscoggin valley through Berlin, Milan, Errol and Millsfield to Dixville Notch, which is 88 miles from Jackson.

Dixville Notch is a magnificent ravine in the Dixville mountains at the northern ex-



Map showing roads leading through the White Mountain district of New Hampshire

tremity of the White Mountain region. The region is famous for fishing and hunting and good hotel accommodations are available. Westward along the valley of the Mohawk river the road passed through Mohawk and along the base of Monadnock mountain, then swings south to Colebrook. Following the course of the Connecticut river, which forms the boundary between Vermont and New Hampshire, the road passes through Columbia, Coos and Stratford to Groveton, which lies in the midst of lofty hills.

From Groveton the road circles Mount Lyon and comes out on to a plain that runs through Northumberland and Coos Junction to Riverton and Jefferson, passing Mount Prospect on the west side. The distance from Dixville to Jefferson is 54 miles.

Jefferson is located on a spur of Starking Mountain, the most southerly summit of the Pilot range, where the view is perhaps the finest in the White Mountains.

The drive from Jefferson to Bretton Woods is 18 miles and takes one through Meadows and Cherry Mountain.

Curious Features

From Bretton Woods the road lies west to Twin Mountain, where a turn is made to the south through the densely wooded uplands of the Franconia range, passing Mount Lafayette, whose lofty peak towers above the others of that vicinity like a monarch among his loyal lieges. The road threads its narrow way through the defile known as Franconia Notch. On the east of this road is Echo Lake, surrounded by towering peaks. Following the Pemigewasset river, the road passes Profile lake, the waters of which reflect the lights and shadows beneath a background of thickly wooded hills, while peering out over the lake is the solemn-faced "Old Man of the Mountains," otherwise known as "The Great Stone Face."

The Flume, another curious freak, where

the waters rush through rocky declivities, can be visited by a side road, which is marked. Motor cars are not admitted so the visitor must hire a carriage or walk.

Continuing south the road passes through almost unbroken forest and the expansive views of hill and valley, characteristic of the preceding portions of the route, are largely absent. From time to time, however, views are obtained of mountain tops to the right and left of the road. This virtually is the end of the White Mountains.

There are numerous short side excursions to be made from almost any point on this circle tour. It matters not which one, or how many are taken, each has its especial charm and beauty.

Good roads from almost any point in New England lead to this White Mountain district. This circle tour may be begun at almost any point, depending upon the direction from which the mountains are approached.

Answers to Inquiries for Route Information

Minneapolis, Minn.—Polson, Mont.

Minneapolis, Minn.—Editor Motor Age—Inform me of the best route to Polson, on Flathead Lake, Mont.—Chas. H. Weber.

From Minneapolis, proceed to Excelsior, Victoria, Waconia, Young America, Norwood, Glencoe, Sumter, Brownston, Stewart, Buffalo Lake, Hector, Bird Island, Olivia, Montevideo, Milan, Appleton, Ortonville, Big Stone City, Millbank, Twin Brooks, Summit, Waubay, Webster, Bristol, Andover, Grotton, Aberdeen, Ipswich, Bowdler, Java, Selby, Moberg, Wakpala, McLaughlin, Tatanka, McIntosh, Watauga, Morristown, Thunder Hawk, Lemmon, Petrel, White Butte, Haynes, Hettinger, Bucyrus, Reeder, Gascoyne, Bowman, Rhame, Marmarth, Baker, Plevna, Westmore, Ismay, Mildred, Fallon, Terry, Miles City, Hathaway, Rosebud, Forsyth, Custer, Pompeys Pillar, Huntley, Billings, Laurel, Park City, Columbus, Merrill, Big Timber, Hunters Hot Springs, Livingston, Boleman, Belgrade, Manhattan, Old Three Forks, Three Forks, Cardwell, Whitehall, Butte, Rocker, Deer Lodge, Garrison, Drummond, Bearmouth, Bonita, Clinton, Missoula, Ravalli, St. Ignatius, Ronan, Polson.

Volumes 5 of the 1916 Automobile Blue Book, published by the Blue Book Pub. Co., 910 South Michigan avenue, Chicago, contains complete running directions for this trip.

Fort Worth, Texas—Washington, D. C.

Fort Worth, Texas—Editor Motor Age—Give route from here to Washington, D. C., passing through Memphis and Chattanooga.—U. B. Francis.

From Fort Worth proceed to Arlington, Dallas, Richardson, McKinney, Anna, White-wright, Bonham, Dodd City, Windom, Honey Grove, Brookston, Paris, Sylvan, Blossom, Detroit, Clarksville, DeKalb, New Boston, Texarkana, Ark., Fulton, Hope, Emmet, Prescott, Boughton, Gurdon, Arkadelphia, Hot Springs, Lonesdale, Benton, Collegeville, Little Rock, Galloway, Lonoke, Prairie Center, Hasen, Clarendon, Brinkley, Forrest City, Madison, Memphis, Tenn., Raleigh, Bartlett, Ellendale, Arlington, Galloway, Braden, Mason, Stanton, Brownsville, Harvey, Jackson, Rollins, Springcreek, Terry, Huntington, Camden, Tennessee River Ferry, Trotter Landing, Hustburg, Waverly, McEwen, Dickson, Charlotte, Delburg, Pardue, Cumberland River Ferry, Ashland City, Bordeaux, Nashville, LaVergne, Jefferson, Walter Hill, Murfreesboro, Deason, Shelbyville, Bellville,

Fayetteville, Tenn., Hazel Green, Ala., Meridianville, Huntsville, Ala., Brownsboro, Gurley, Paint Rock, Woodville, Larkinsville, Scottsboro, Bellfonte, Stevenson, Bridgeport, Ala., Richard City, Tenn., South Pittsburgh, Jasper, Rankins Ferry, Wauhatchie, Chattanooga, Ooltewah, Tucker Springs, Charleston, Calhoun, Athens, Niota, Sweetwater, Philadelphia, Tenn., Loudon, Lenoir City, Knoxville, Straw Plain, New Market, Jefferson City, Dandridge, Reedtown, Clevengertown, Wilsonville, Newport, Huckleberry, Wolf Creek, Tenn., Hot Springs, N. C., Duell Hill, Marshall, Mars Hills, Grantville, Weaver-ville, Asheville, Swannona, Black Mountain, Ridge Crest, Old Fort, Marion, Bridgewater, Glen Alpine, Calvin, Morganton, Connellys Springs, Hildebrand, Hickory, Claremont, Catawba, Statesville, Cleveland, Salisbury, Spencer, Lexington, Thomasville, High Point, Jamestown, Greensboro, Burlington, Graham, Mebane, Hillsboro, Durham, Bragtown, Knapp of Reeds, Stem, Providence, Oxford, Stovall, Bullock, N. C., Clarksville, Boynton, Mecklenburg, Cochran, Dinwiddie, Petersburg, Manchester, Richmond, Va., Ashland, Bowling Green, Fredericksburg, Falmouth, Mountain View, Garrisonville, Dumfries, Occoquan, Lorton, Accotink, Alexandria, Washington, D. C.

Volumes 5 and 6 of the Automobile Blue Book, published by the Automobile Blue Book Pub. Co., 910 S. Michigan Ave., Chicago, contain complete running directions for this trip.

Columbia, S. C., to Minneapolis

Columbia, S. C.—Editor Motor Age—Give best routing from here through Washington to Minneapolis.—G. S. Heyward.

From Columbia, S. C., proceed to Pontiac, Flanay, Camden, Cassatt, Bethune, McBee, Patrick, Cheraw, Rockingham, N. C., Ellerbe Springs, Jackson Springs, West End, Pinchurst, Southern Pines, Cameron, Lemon Springs, Jonesboro, Lockville, Moncure, Haywood, Merry Oaks, Bonnal, Newhill, Apex, Cary, Method, Raleigh, Morrisville, Nelson, Durham, Hillsboro, Mebane, Graham, Burlington, Greensboro, Reidsville, Pelham, Stokesland, Va., Danville, New Design, Chatham, Hurt P. O., Alta Vista, Clarion, Lynchburg, Concord, Spout Spring, Appomattox, Evergreen, Pamplin, Prospect, Farmville, Burkeville, Nottoway, Blackstone, Wellville, Wilsons, Hebron, Sutherland, Petersburg, Manchester, Richmond, Ashland, Coatesville, Spotsylvania, Fredericksburg, Falmouth,

Garrisonville, Dumfries, Occoquan, Accotink, Alexandria, Washington, D. C., Bethesda, Md., Rockville, Gaithersburg, Damascus, Ridgeville, Frederick, Boonsboro, Funkstown, Hagerstown, Clear Spring, Indian Spring, Hancock, Cumberland, Frostburg, Grantville, Keyers Ridge, Addison, Pa., Somersfield, Farmington, Hopwood, Uniontown, Brownsville, West Brownsville, Centerville, Bensville, Scenery Hill, Washington, Claysville, West Alexander, Elm Grove, W. Va., Wheeling, Bridgeport, O., Cambridge, Zanesville, Jacksonstown, Newark, Granville, Columbus, Marblecliff Station, Dublin, Marysville, Zanesfield, Bellefontaine, Lima, Delphos, Van Wert, New Haven, Ind., Fort Wayne, Churubusco, Noblesville, South Bend, Columbia City, Pierceton, Warsaw, Atwood, Plymouth, Wanatah, Valparaiso, Chicago, Oak Park, Addison, Elgin, Algonquin, Crystal Lake, Ridgefield, Hebron, Lake Geneva, Wis., Elkhorn, Lauderdale Lakes, Eagle, Oconomowoc, Mayville, Theresa, Fond du Lac, Van Dyne, Oshkosh, Dale, Redfield, Fremont, Weyauwega, Waupaca, Amherst, Amherst Jct., Stevens Point, Auburndale, Marshfield, Specer, Unity, Abbottsford, Owen, Withee, Thorpe, Stanley, Chippewa Falls, Eau Claire, Menominee, Knapp, Baldwin, Roberts, Hudson, Lakeland, Minn., St. Paul, Minneapolis.

Vols. 5 and 4 of the Automobile Blue Book, published by the Automobile Blue Book Publishing Co., 910 S. Michigan Ave., Chicago, contain complete running directions for this trip. Price \$3.00 each.

Abilene, Kans.—Lake Geneva, Wis.

Abilene, Kans.—Editor Motor Age—Give touring directions from here to Lake Geneva, Wis.—Rev. S. A. Chappell.

From Abilene proceed to Junction City, Manhattan, Wamego, St. Marys, Roseville, Silver Lake, Topeka, Horton, Everest, Troy, Wathena, St. Joseph, Mo., Avenue City, King City, Ford City, Albany, Bethany, Eagleville, Lamoni, Ia., Leon, Osceola, Medora, Indianola, Des Moines, Colfax, Newton, Kellogg, Grinnell, Brooklyn, Victor, Ladora, Marengo, South Amana, Oxford, Coralville, Iowa City, West Liberty, Moscow, Durant, Davenport, Moline, Watertown, Hillsdale, Erie, Galt, Sterling, Dixon, Grand Detour, Oregon, Byron, Rockford, Cherry Valley, Belvidere, Harvard, Ill., Walworth, Wis., Fontana, Lake Geneva.

Vols. 5 and 4 of the 1916 Automobile Blue Book, published by the Automobile Blue Book Pub. Co., 910 South Michigan avenue, Chicago, contain complete running directions for this trip.

Standard Specifications for 1½-Ton

New Requirements Are Issued as War Department Explains

INTERCHANGEABILITY of Parts—All parts of truck must be constructed to definite standard dimensions, with proper tolerance and clearances, so that any part of same may be replaced and properly fitted and adjusted without requiring additional tool work or machine work on the parts.

Standard Parts—It is desired that as many parts of the truck as practicable be of standard design and constructed to standard dimensions, which will make them interchangeable with the same parts made by other manufacturers. It is also desired that these parts be constructed in accordance with S. A. E. standards.

Guarantee—Each bidder will be required to guarantee his vehicle or vehicles against defects in material or workmanship for a period of one year. This guarantee shall include the delivery of the defective part or parts to any point in the United States. After the installation of the new part, the defective part will be returned to the manufacturer if he so requests. The manufacturer will pay the transportation charges on all returned parts. The above guarantee shall also apply to all parts and accessories which are not made by the bidder.

DESCRIPTION

Load Capacity—The trucks must be of sufficient strength, and provided with sufficient power, to carry and propel the following gross load under the most severe service conditions:

Pay load.....	3000 lb.
Body	1060 "
Three men.....	525 "
Extra equipment.....	290 "

Total.....4775 lb.

The extremely severe service conditions under which these trucks will be operated indicate that they should be designed for a nominal pay load of 4000 lb.

Load Distribution—The distribution of load between front and rear axles, with the normal pay load equally distributed in the standard truck bodies herein specified, shall be not less than 30 per cent or more than 35 per cent on the rear wheels in two-wheel drive trucks. In four-wheel drive trucks the total weight of the loaded vehicle shall be as equally divided as possible between the front and rear wheels.

Weight of Chassis—The maximum weight of chassis, without body or extra tool and parts equipment, and without gasoline, water or oil, must be not more than 6000 lb. A definite statement must be made showing exactly what equipment is included in the stated weight.

Road Speed—The governor on engine shall be set so as to give a road speed of 15 m.p.m., with a maximum governed engine piston speed of 1100 ft. a minute.

Type of Drive—The trucks may be provided with any suitable standard type of drive, such as internal gear, bevel gear, worm gear or chain drive. Preference will be given to that type of final drive which provides the greatest amount of ground clearance, in conjunction with provision for retaining grease or oil and excluding dirt.

Either two-wheel drive or four-wheel drive may be employed.

The following items are considered of vital importance:

Transmission—The transmission shall be of the selective sliding gear type, and must have not less than four speeds forward and one reverse, and must be installed as a separate unit

WASHINGTON, D. C.—Editor MOTOR AGE.—Herewith are specifications for 1½ and 3-ton motor trucks, for your information, and in this connection your attention is invited to the following: Referring to the specifications for 1½ and 3-ton motor trucks issued by the War Department, it is desired to state that these specifications were prepared by a special committee composed of officers of the various bureaus of the War Department interested in truck construction, and which have motor trucks in operation in connection with their field activities.

The aid of the Society of Automobile Engineers was invoked for assistance in the preparation of these specifications, and the specifications were passed upon, after careful consideration, by the Truck Standards Division of the Society of Automobile Engineers, who rendered most valuable and basical assistance in the preparation of these specifications.

It is desired expressly to state that it is not intended that these specifications shall limit either the War Department or truck manufacturers to the production of trucks that meet in all particulars the requirements of these specifications. On the contrary, it is expected that trucks manufactured for military services will depart more

on a sub-frame between the engine and differential. It must be installed with a three-point mounting in order to prevent the distortion of frame from breaking the transmission legs. The high speed gear shall be direct without reduction in the transmission unless the truck is four-wheel drive.

The splined driving shaft for sliding gears must be made of best quality alloy steel, properly heat treated.

The low gear ration of transmission shall be suitable for giving a tractive factor of not less than .338, and the total low gear reduction of transmission and final drive shall be not less than 40 to 1.

The main drive shaft, and also the counter-shaft of transmission, must all be provided with ball or roller bearings of best make and suitable capacity. The use of plain bearings in the transmission assembly will not be permitted, except in the case of the reverse gear. If the bearings are adjustable, the adjustment must be accomplished by the use of shims.

The transmission must be accessible from below the body for inspection, adjustment, removal, or repair. Transmission gears constructed as an integral part of the rear axle, or in any other manner which does not provide proper spring suspension, will not be acceptable.

Ground Clearance—The ground clearance at all parts of truck, except at drive sprockets and hub brake drums, shall be not less than 9½ in. The ground clearance at the center of truck between front and rear wheels shall be not less than 18 in., and the difference between this center clearance and the axle clearance may be decreased in proportion to the distance from the center of the truck. The clearance under engine pan shall be not less than 11 in.

Wheelbase—The wheelbase must be suitable for the use of a 10-ft. body, and shall be not less than 124 in. or more than 160 in.

Turning Circle—The truck shall be so designed as to turn in a circle of not more than 55 ft., measured from outside wheel tracks. Positive stops must be provided to limit the steering angle of the steering wheels.

Gage—The gage of wheels on 1½-ton trucks, measured from center to center of felloe bands, shall be as follows:

WASHINGTON, April 16—The Quartermaster General of the army has formally approved the specifications for army trucks recently agreed upon by representatives of his department and members of the Society of Automobile Engineers, thus paving the way for bids which will be asked for probably 40,000 such trucks. These will include both 1½- and 3-ton trucks. Officers of the quartermaster corps express confidence in a prompt and satisfactory response from

4-in. single tires.....	58½ in.
6-in. single tires (used on 4-wheel drive)	60½ in.
7-in. single tires.....	61½ in.

ENGINE AND COOLING SYSTEM

Engine—The engine must be of the 4-cycle type, water-cooled, having not less than four cylinders, and provided with mechanically operated poppet valves. It shall have a total piston displacement of not less than 312 cu. in. and must develop a torque of not less than 2000 in.-lb. at not more than 1000 ft. of piston speed per minute. The torque at 500 ft. of piston speed per minute shall be not less than 90 per cent of the maximum torque. The engine must be under a removable hood, and located in a readily accessible position.

Cylinders—The cylinders shall be cast from best quality gray iron, and must be free from sand holes, blow holes, cold shuts or other imperfections. The bore of finished cylinders must be the same diameter from end to end, and finished to a tolerance of plus or minus .0005 in. for diameter and eccentricity.

Pistons—The pistons shall be designed and constructed in accordance with the best standard practice. They shall be light in weight, heavily ribbed to secure proper strength, and made of best quality gray cast iron, free from blow holes, sand holes, shifted core or other imperfections. They shall be properly annealed, machined with light cuts to avoid distortion and ground to a high finish, proper tolerance and a suitable clearance in cylinders.

The clearance between maximum diameter

and 3-Ton Gasoline Motor Trucks

Result of Special Committee's Work— Flexibility of Enforcement

or less from these specifications, depending upon the equipment of manufacturers and their facilities for varying their production to meet, where practicable, the major requirements of these specifications.

It is considered that the provisions of these specifications are desirable, in the light of experience so far had in the use of trucks in military operations in this country. They have been prepared in accordance with suggestions presented by engineers who have had opportunity to observe trucks in military operation under conditions which our armies in the field will encounter, and it is felt that the particular features covered in paragraph 20 are of major importance. It is especially pointed out that paragraph 18 specifically provides for such variations from the standard specifications as manufacturers may find it necessary to take advantage of.

The hope is that these specifications will be regarded by manufacturers as the final goal, the attainment of which is desired by the War Department in a military truck, and that it will be understood that the Government is not establishing a standard with a view to making arbitrary requirements in non-essentials.—HENRY G. SHARPE, Quartermaster General.

manufacturers of trucks when the bids are sent out, which is said will be about June 1.

The bids will be asked on the condition that the government may order the trucks in any quantities desired, not in excess of the maximum number stipulated. It is not anticipated that the first orders will be for an exceptionally large number, these orders depending entirely upon the rapidity with which the various units of the new army are organized.

of piston and the diameter of cylinder bore shall not be less than .003 in. or more than .005 in. They shall be properly tapered or relieved at the head end to provide for expansion, and shall have an internal stiffening flange at the open end.

Piston Pins—The piston pins shall be hollow, with a wall of proper thickness. They shall be made of steel of suitable quality for the purpose, properly hardened, and ground to a high finish and proper tolerance. The diameter of piston pins shall not be less than .003 in. as a base for comparative scleroscope readings.

Piston Rings and Grooves—The piston shall be provided with at least three ring grooves of proper width and depth, all located between the wrist pin and the head end of piston. These grooves shall be ground to a high finish at the sides. Piston ring grooves to be finished in accordance with S. A. E. practice.

If the triple type of ring is used, having one internal ring and two external rings, two ring grooves may be used, each provided with a triple ring, or one groove may be provided with a triple ring and the other with the ordinary type of single ring.

The single rings shall be machined to a high finish and proper tolerance on outside periphery, and ground on sides in accordance with S. A. E. recommended practice.

Valves—The intake valves and exhaust valves must be interchangeable and made of alloy steel of best quality for the purpose.

The complete composition of the steel must be stated definitely, and all valves must be heat treated to develop the proper physical properties.

The valves must be constructed of one piece for both stem and head, must have a large radius fillet between the stem and head and must be provided with 45 deg. seats.

All parts of valve mechanism must be completely inclosed. If the engine is of the L-head or T-head type, the valve springs, stems, and tappets must be inclosed by a suitable readily removable cover plate, and if the engine is of the valve-in-head type, the overhead valve mechanism must be completely inclosed with a suitable readily removable cover, or the bearings for rocker arms must be provided with suitable felt washers to prevent the entrance of dust or dirt.

Connecting Rods—The connecting rods shall be of I-beam section, drop forged from steel equal to S. A. E. steel No. 1035, and properly heat treated. The crank end of the connecting rods shall be provided with bronze bushings faced with a proper thickness of best quality bearing metal. These bearings shall be scraped to a proper fit with the crank, and in proper alignment at all positions of the crank, and for two-bolt rods shall be held in place with suitable doweling. The bearing shall be provided with proper grooves and oil holes for lubrication. The bearing on piston pin shall be in the connecting rod end, and a suitable solid phosphor bronze bushing pressed in, shall be used.

Crankshaft—The crankshaft shall be forged from a single piece of steel, equal in quality to S. A. E. specifications No. 1045, and heat treated to develop the following minimum physical properties:

Brinell hardness, 250-275 (scleroscope 41-45).
Reduction of area, 45 per cent.
Elongation, 16 per cent in 2 in.

The crankshaft shall be sufficiently large in section at all points to prevent objectionable torsional or lateral vibration at all practicable engine speeds and loads. Both crank bearings and main bearings shall be large in area in order to give low bearing pressures and long bearing life without replacement or adjustment. The crankshaft shall have not less than three main bearings for a four-cylinder engine. The crank pins and main bearings of crankshaft must be ground to a high finish and a total tolerance of .0005 in. for eccentricity, and a tolerance of plus or minus .0005 in. for diameter. The crankshaft must

be accurately balanced for static and running balance, at the governed speed of the engine.

The flywheel flange must be forged integral with the crankshaft. This flange must be large in diameter and so designed as to secure an accurate centering of the flywheel on the flange.

Crankcase—The crankcase is to be divided in a horizontal plane, with all bearings in the upper section. It must be so designed as to be light in weight and also of proper strength, and must be provided with suitable ribbing in order to secure a strong case free from distortion or weakness, and without excessive weight. It should be so designed as to permit any piston to be removed from its cylinder and taken out of the case without removing the cylinder or crankshaft.

All oiling receptacles, pipes and oil guides, except the constant level troughs for connecting rods, shall be either pressed or cast integral with the crankcase, or the oil pipes may consist of external leads. If external leads are used, they shall be short and rigid, or properly clipped to prevent vibration and chafing.

The crankcase must also be provided with an effective oil level indicating device, of the bayonet blade type.

The crankcase must be a smooth casting, free from defects of material, design or construction.

All joints or connections in crank case shall be made thoroughly oil tight.

Oil Capacity—The oil reservoir of engine must have sufficient capacity for lubricating oil to permit the truck to run fully loaded a distance of not less than 200 miles over ordinary roads without replenishing the supply of oil.

Lubricating System—The engine shall be lubricated by a pressure oiling system. The oil pump must be positive driven and provided with suitable screens of not less than 30 mesh, and which are readily removable for cleaning. It is desirable that the oil pump and screens be so arranged as to make the screens self-cleaning by an intermittent reverse flow of oil. The inlet to oil pump must be a sufficient distance above the bottom of oil reservoir to provide a suitable settling chamber.

The oil pump must deliver a large volume of oil, and must maintain a pressure of not less than 30 lbs. per sq. in. at an engine speed of 800 r.p.m. A suitable relief valve on the oiling system must be provided.

Frictional Horsepower—The engines furnished with trucks must be thoroughly "run-in," so that the trucks may immediately after delivery be placed in continuous severe service without danger of damage to the engines. When the trucks are delivered the engines must be in such condition that the power required to drive any engine at 1000 ft. of piston speed, and with the fan and pumps in operation, shall not exceed 18 per cent of the rated horsepower of the engine with wide open throttle at the same speed.

Suspension—The engine must be mounted with a three-point suspension, or on a sub-frame having a suitable three-point suspension, which will effectively prevent the distortion of the frame from straining any part of the engine, clutch, or transmission.

Governor—A centrifugal type engine speed limiting governor of approved make shall be provided and adjusted so as to prevent the truck from exceeding a speed of 15 m.p.h. on high gear. The governor shall be adjustable and must have provision for sealing the ad-

justment and all connections of drive shaft with suitable lead seals.

Engine Shield—Suitable means must be provided to protect the carburetor, magneto and generator from water and mud. If a removable shield is used it must be fastened by means of spring clips which will permit it to be removed with the hands only and without tools of any kind. In case the engine crank case is provided with cast or stamped webs equally as effective as the engine shield herein described, the engine shield will not be required.

Carburetor—The carburetor must be of such design, and provided with such heating devices, as will enable it to utilize gasoline having an initial boiling-off temperature of not less than 122 deg. F., a 25 per cent boiling-off temperature of not less than 230 deg. F., a 50 per cent boiling-off temperature of not less than 300 deg. F., a 90 per cent boiling-off temperature of not less than 350 deg. F., and a dry point temperature of not less than 400 deg. F. The engine must utilize gasoline of the grade mentioned and at the same time operate with satisfactory economy and regularity at all engine speeds and loads.

A metal partition shall be installed on the inside of tank of such height as to give a capacity of 6 gal. on each side of the partition. Suitable baffle plates shall be installed on each side of partition in order to prevent excessive splashing. The connection from tank to carburetor shall be made from the bottom of each compartment, through a three-way cock, thus giving a positive reserve supply of 6 gal. A readily accessible shut-off valve shall also be provided in the gasoline supply line to carburetor.

The radiator shall be of the fin and tube type, having cast or pressed upper and lower headers, with bolted-on cooling section or sections. If the cooling section consists of individual tubes with fins, the tubes must be not less than $\frac{3}{8}$ -in. outside diameter. If the fins are continuous, the tubes may be a minimum of one-fourth inch in diameter. The overflow pipe must be of copper or brass, and not smaller than $\frac{3}{8}$ -in. tubing.

Starting Motor—Suitable provision must be made either on the engine or elsewhere, for the installation of a starting motor, of proper size and design. The starting motor is not to be furnished, but the truck must be so arranged as to readily permit of its installation at any time if so desired. The flywheel must be provided with gear teeth for use with the starting motor. These gear teeth must be cut in accordance with S. A. E. recommended practice.

Electric Lighting and Ignition—The truck must be provided with a suitable electric lighting system and dual ignition system. The electric lighting system shall consist of a generator driven from the powerplant, a reverse current voltage cut-out, 100 amp. hr., 3 cell, lead acid battery, or 75 amp. hr. 5 cell nickel-steel alkali battery, electric lights, fuses, wiring and other necessary details. The ignition system shall consist of a high tension magneto of best make and a battery and coil ignition system. One distributor and one set of spark plugs may be used in common with the two separate ignition systems. The current for battery ignition will be taken from the electric lighting battery. Both battery ignition and magneto must be readily controlled from the driver's seat, and the spark advance lever on steering wheel must control both ignition systems and give a suitable degree of spark advance for all positions of the spark advance lever. The range of spark advance shall not be less than 30 deg. of crank angularity. The full retard position of the spark lever shall retard the battery spark at least 3 deg. after top center.

Generator—The generator shall be of the fully inclosed direct current, constant voltage type, and must have a continuous capacity of

12 amp. The voltage of the generator when installed on the truck shall be 8 volts at 1 amp., and 7 volts at 12 amp., within limits of plus or minus .2 volt. The voltage regulation must be the same with varying engine speeds, up to governed engine speed. It must be driven from the engine by means of suitable gears or silent chain drive. The gears or silent chain drive must be completely inclosed, thoroughly lubricated and effectively protected from dust and dirt. If driven by means of silent chain drive, the chain must be readily adjusted. Definite data in reference to the material and construction of chain or gears must be given.

High Tension Magneto—A high tension magneto of best make must be installed on the engine and positively driven either by gears or by a silent chain drive. If driven by gears, the gears must run in oil, and if driven by silent chain drive, the chain must be readily adjustable. In either case the chain or gears must be completely inclosed and thoroughly lubricated. The magneto must be arranged for clockwise rotation. Both the magneto and the mounting for same must be constructed in accordance with S. A. E. recommended practice.

Lighting Equipment—The truck shall be provided with the following lighting equipment:

1—Searchlight, with quick-acting vertical and horizontal adjustment, silver plated brass or copper parabolic reflector, or glass parabolic reflector silvered on the back, with 21-c.p. tungsten focusing bulb.

CHAMPION SPARK PLUG IN CANADA

Toledo, Ohio, April 13—Business during the last year for the Champion spark Plug Co. in Canada increased more than 200 per cent, and as a result the Champion Spark Plug Co., Ltd., of Canada has been organized with a capital of \$100,000, and a branch has been opened at Windsor, Ont.

REPUBLIC TRUCK IN WEST

Los Angeles, April 13 — The Republic Motor Truck Co., Alma, Mich., is seeking a site here for the erection of an assembly plant. Announcement to this effect has been made by D. F. Poyer, manager of the company's local branch and a stockholder in the organization. Mr. Poyer said to-day that it is planned to build 2000 trucks here the first year of the plant's operation. About 125 mechanics will be employed at the start.

INAUGURATES SERVICE GIFT PLAN

Detroit, April 14 — The Studebaker Corp. of America plans to make special anniversary gifts at the end of each year of service to employees who on and after Jan. 1, 1917, have been with the company for two or more continuous years. Under the plan all employees, regardless of age, position or sex, excepting those whose salaries are \$2,000 or more a year or who receive pensions, will receive annually an anniversary check amounting to from 2 to 10 per cent of their earnings for the year ended. Continuous service is necessary to make workers eligible for the gift. Absence of thirty days or less, due to sickness, vacations, shut-downs or inventories will not be regarded as interruptions of continuous service.

2—Side lamps, combination oil and electric, with 8-c.p., 6-8 volt tungsten bulbs.

1—Electric instrument lamp, with 2-c.p., 4-volt bulb, and one combination oil and electric tail lamp with 2-c.p. bulb, connected in series.

1—Portable trouble lamp, 8-c.p., with cord, and plug with separate socket.

1—Ammeter of best make, for indicating the charge and discharge of battery.

FRAME AND BODY

Frame—The frame shall be constructed of pressed steel or standard rolled structural sections. The frame and suspension must be so designed as to prevent cramping of any part, due to distortion of frame because of uneven road condition.

The distance from the back of the driver's seat to the rear end of frame shall be 10 ft. This frame length will permit of sufficient overhang of body to allow the installation of towing hooks and rear bumpers.

The frame shall be reinforced at proper intervals with suitable cross members thoroughly fastened to the frame with hot rivets or fitted bolts riveted over nuts. All holes in the frame shall be drilled, not punched. A suitable towing hook shall be attached to each side of the front end of frame. These towing hooks may be installed on the front bumper.

Steering Connections—The steering knuckle tie rod, steering knuckle arms and steering gear connecting rod must be located back of the axle in order that the front axle may protect them against damage from obstructions. The steering knuckle tie rod must be straight from end to end, and located as far above the lower edge of axle as possible and entirely protected by the axle from spring seat to spring seat.

Location of Control—The gearshift and hand brake levers must be placed at the driver's right, with the hand brake lever to the right of the gearshift lever. The hand brake lever is to be pulled back for brake application. The gearshift lever must be fitted with a latch guarding the reverse position.

Gearshift Lever Handle Positions—The gearshift lever handle positions shall be as follows:

First speed—Forward and left.

Second speed—Rear and left.

Third speed—Forward and right.

Fourth speed—Rear and right.

Reverse—Guarded by a latch in separate gate. Extreme left through neutral, then forward.

Clutch and Brake Pedal—The clutch pedal should be located to the left, and the foot brake pedal to the right, of the fore and aft center line of the steering column.

Accelerator Pedal—The accelerator pedal shall be placed to the right of the brake.

TRANSMISSION AND RUNNING GEAR

Clutch—The clutch may be either dry multiple disk or dry single disk type, having one series of plates faced with wire asbestos friction material. It must be of suitable design for transmitting the maximum torque of the engine without slipping, must be easily accessible for repair or replacement of parts and must be provided with a suitable arrangement for permitting easy engagement which will not require frequent adjustment or renewal of friction material.

Flanges must be fitted on the clutch pedal in order to prevent the driver's feet from slipping off of same. The pressure on the clutch pedal pad necessary to disengage the clutch must be not more than 90 lb. or less than 70 lb.

Transmission Drive Shaft—The transmission drive shaft, connecting clutch with transmission, must be provided with two universal joints of the lubricated bearing type. The fabric type of joint will not be acceptable. The joints must be entirely inclosed and means provided for suitable lubrication and for retaining the lubricant in the joint. Pro-

vision must be made to prevent the shaft whipping loose in the event of joint failure.

Two universals must be provided between the transmission and differential. These universal joints must be so designed as to contain a proper quantity of lubricating grease and must each be provided with a tight leather boot made of best quality, first cut leather. The use of fabric universal joints will not be permitted.

Drive Axle—The trucks may be either internal gear drive, chain drive, worm gear drive or double reduction gear in a central housing. The driving axle may be either full floating or semi-floating type.

The design, material and construction of the drive axle and final drive shall be in every respect in accordance with the best standard practice.

Differential—The differential shall be of such a type as to automatically permit the wheels to revolve at different speeds without complete loss of torque on either wheel, and also to apply at least normal torque to whichever wheel shall have traction. These requirements shall be met when the vehicle is running either forward or backward.

It shall consist of a forged steel or cast steel case, to which the large gear is attached by being bolted or riveted. This case shall also contain the necessary gears for producing the required differential action and shall be provided with suitable steel roller or ball bearings of best make. The case shall be supported on its bearings independent of the drive shaft ends. The drive shaft ends shall be properly fitted and connected by means of suitable splines to the gears in differential case. The spline connection shall be made in accordance with S. A. E. standards.

The bevel drive pinion shall be forged integral with its shaft. This shaft shall be made of steel equal to S. A. E. specification No. X3335, properly heat treated, and provided with two sets of taper roller or ball bearings of best make and suitable means for the ready adjustment of the bevel driving pinion in relation to the large driven gear, and vice versa. If ball bearings are used, suitable means shall be provided to take care of thrust loads.

Worm or Bevel Gear Drive—If the rear axle is of the worm or bevel gear driven type, it may be a built-up structure using steel tubes pressed or shrunk into a properly ribbed cast steel or malleable iron axle housing, or a suitable one-piece cast steel or malleable iron axle housing may be used without any steel tubes. Truss rods may be used at the discretion of the constructor, but the factor of safety of the rear axle load carrying assembly or member must be large enough to preclude any likelihood of breakage under the most severe service conditions.

Internal Gear Drive—If the final drive is an internal gear, provision must be made for entirely inclosing the driving gears and for retaining the lubricating oil or grease and for preventing same from getting onto the brake bands.

Brakes—Two independent sets of double acting brakes shall be provided. The emergency brake must act directly on the rear wheels and be operated by a hand lever with ratchet. Service brakes may act directly on the rear wheels or on the drive shaft and must be operated by a pedal. Brakes must be lined with an approved friction material and must be so constructed that they may be readily adjusted and securely locked in adjustment without removing the wheels or other parts.

Suitable flanges must be fitted on the brake pedal to prevent the driver's foot from slipping off of same.

Brake rods are to be sufficiently stiff or so supported as to prevent whipping or rattling.

Brakes must be sufficiently powerful either to slip the wheels or stop the truck within a distance of not more than 50 ft. with either

the service brakes or the emergency brakes, when the normally loaded truck is running on a level, hard and dry macadam road at a speed of 15 m.p.h.

The service brakes may act directly on the drive wheel, brake drums, or on the driving axle next to the propeller shaft.

Brake adjustments must be readily accessible and must be adjustable without the use of special tools. All brake clevises, pins, or other bearings in brake rods or brake connection must be provided with bronze bushings.

The design of brakes and brake connections must be such that the application of drive wheel brakes is not affected by relative movement between the frame and axle.

All brakes must be mounted in such a manner that the braking strains will be taken by parts which are strong enough to withstand these strains under the most severe braking conditions.

Wheels—The wheels shall be of suitable size for the use of 36-in. S. A. E. demountable solid tires, and shall be best quality cast steel wheels, of proper design, strength and construction, and made in accordance with the best standard practice.

The wheels shall be of suitable size and design for the use of 36 by 4 single, solid S. A. E. demountable rubber tires on front wheels, and 36 by 7 single, solid S. A. E. demountable tires on rear wheels. All wheels shall be of proper strength to resist the vertical and lateral loads in the most severe service, and with the maximum load and speeds for which the truck was constructed.

HARROUN FACTORY RECEIVES

Detroit, April 13—An informal reception to celebrate the completion and equipment of the new Harroun Motors Corp. plant at Wayne was held April 11. Special interurban cars took the visitors to the plant from the general offices and back.

MAXWELL GASOLINE ECONOMY

San Diego, Cal., April 10—A Maxwell touring car which had been used in a fleet of mountain stage coaches operating in southern California for more than two years has just made a new record of 46.5 miles with a gallon of gasoline. About thirty Maxwell dealers competed for a cup which was offered for the best showing. The winning car was driven by Clarence Bradshaw, San Diego, who carried two official observers according to the rules. Every car entered was a stock model. The car that won had been traded in at the San Diego agency, the Lord Motor Car Co., a few days before the run.

BODY MAKER TO REBUILD

Indianapolis, Ind., April 16—W. B. Ansted, president of the Central Mfg. Co., Connersville, Ind., body manufacturer, whose plant was destroyed by fire two weeks ago, announced to-day that production has not been stopped. Contracts have been let for a new building. In the meantime the company is manufacturing bodies at the plant of the Rex Mfg. Co. and the Connersville Industrial Building. The loss was \$150,000.

A new plant will be erected. It will be larger than the plant which was destroyed.

Tires—On two-wheel drive trucks the tires shall be 36 by 7 single tires on rear wheels, and 36 by 4 single tires on front wheels, both front and rear tires demountable.

On four-wheel drive trucks the tires shall be 36 by 6 single, demountable, both front and rear.

Hub Odometer—A hub odometer of best make, and of suitable design and construction for most satisfactory use on motor trucks, shall be provided and installed on one of the front wheels. This odometer shall have not less than five figures in the dial, and provision shall be made to prevent leakage of grease into mechanism.

SPRINGS

Springs—The chassis spring suspension must be of such design and construction as to relieve the body and chassis above springs of excessive vibration when the vehicle is traveling empty or partially loaded over rough surfaces at maximum speed.

SPECIFICATIONS FOR 3-TON TRUCKS

The specifications for 1½-ton trucks shall apply in the furnishing of 3-ton trucks, except as follows:

Load Capacity—The trucks must be of sufficient strength, and provided with sufficient power, to carry and propel the following gross load under the most severe service conditions:

Pay load.....	6000 lb.
Body	1500 "
Three men.....	525 "
Extra equipment.....	200 "

8225 lb.

The extremely severe service conditions under which these trucks will be operated indicate that they should be designed for a nominal pay load of 7000 to 8000 lb.

Weight of Chassis—The maximum weight of chassis, without body or extra tool and parts equipment, and without gasoline, water, or oil, must be not more than 8000 lb. A definite statement must be made showing exactly what equipment is included in the stated weight.

Wheelbase—The wheelbase must be suitable for the use of a 12-ft. body, and shall be not less than 124 in. or more than 156 in.

Gage—The gage of wheels on 3-ton trucks, measured from center to center of felloe bands, shall be as follows:

5-in. single front tires.....	59½ to 64½ in.
5-in. dual rear tires.....	64½ in.

Engine—The engine must be of the 4-cycle type, water cooled, having not less than four cylinders, and provided with mechanically operated poppet valves. It shall have a total piston displacement of not less than 414 cu. in. and must develop a torque of not less than 2475 in.-lbs. at not more than 1000 ft. of piston speed per minute. The torque at 500 ft. of piston speed per minute shall be not less than 90 per cent of the maximum torque.

The distance from the back of the driver's seat to the rear end of frame shall be 11 ft. 11 in. This frame length will permit of sufficient overhang of body to allow the installation of towing hooks and rear bumpers.

The low gear ratio of transmission shall be suitable for giving a tractive factor of not less than .333, and the total low gear reduction of transmission and final drive shall be not less than 50 to 1.

The wheels shall be of suitable size and design for the use of 36 by 5 single, solid S. A. E. demountable rubber tires on front wheels, and 36 by 5 dual, solid S. A. E. demountable tires on rear wheels. All wheels shall be of proper strength to resist the vertical and lateral loads in the most severe service, and with the maximum load and speeds for which the truck was constructed.

Tires—On two-wheel drive trucks the tires shall be 36 by 5 dual tires on rear wheels, and 36 by 5 single tires on front wheels, both front and rear tires demountable.



Electrical Equipment of the Motor Car -



—By Harold P. Fox, Director of Electrical Effort.

ANYONE WHO BELIEVES AGAINST THE NECESSITY OF ELECTRICAL EQUIPMENT IN MOTOR CARS, and who is not an expert in such matters, is not only ignorant, but is also not a motor car owner. The only person who is not a motor car owner is the one who is not a motor car owner. The only person who is not a motor car owner is the one who is not a motor car owner.

The importance of electrical equipment in the motor car is not only a matter of fact, but it is also a matter of principle. The motor car is a machine, and like all machines, it must be equipped with the proper electrical equipment. The motor car is a machine, and like all machines, it must be equipped with the proper electrical equipment. The motor car is a machine, and like all machines, it must be equipped with the proper electrical equipment.

Part XXXIV—Motor and Engine Connections—Gear Working

It is the duty of the motor car owner to see that his car is properly equipped with the proper electrical equipment. The motor car is a machine, and like all machines, it must be equipped with the proper electrical equipment. The motor car is a machine, and like all machines, it must be equipped with the proper electrical equipment.

Gear Working

When the motor car is properly equipped with the proper electrical equipment, it will be able to run on the road. The motor car is a machine, and like all machines, it must be equipped with the proper electrical equipment. The motor car is a machine, and like all machines, it must be equipped with the proper electrical equipment.



FIG. 1. MOTOR CAR ENGINE AND GEAR MECHANISM.

The motor car is a machine, and like all machines, it must be equipped with the proper electrical equipment. The motor car is a machine, and like all machines, it must be equipped with the proper electrical equipment.



FIG. 2. MOTOR CAR ENGINE AND GEAR MECHANISM.

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FIG. 3. MOTOR CAR ENGINE AND GEAR MECHANISM.

and a considerable number of the men who had been in the army in the first world war.

"There is a great deal of interest in the army in the first world war," said a man who had been in the army in the first world war. "There is a great deal of interest in the army in the first world war." "There is a great deal of interest in the army in the first world war." "There is a great deal of interest in the army in the first world war."

New York Women Fighting to Drive

NEW YORK, April 17.—The New York Women's Driving Club, which was organized in 1915, is now in the process of reorganizing. The club was organized in 1915, and has since that time been active in promoting the cause of women's driving. The club has a number of members, and is now in the process of reorganizing. The club was organized in 1915, and has since that time been active in promoting the cause of women's driving. The club has a number of members, and is now in the process of reorganizing.

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It was the first time that a woman had driven a car in the city of New York. The woman was driving a car in the city of New York.

under a name which had been used in the past. The woman was driving a car in the city of New York.

Recovering by Windsorville

WINDSORVILLE, N. Y., April 17.—The Windsorville, N. Y., town, which was founded in 1817, is now in the process of recovering. The town was founded in 1817, and has since that time been active in promoting the cause of recovery. The town has a number of members, and is now in the process of recovering.

There is a great deal of interest in the town of Windsorville. The town was founded in 1817, and has since that time been active in promoting the cause of recovery. The town has a number of members, and is now in the process of recovering. The town was founded in 1817, and has since that time been active in promoting the cause of recovery. The town has a number of members, and is now in the process of recovering.



The woman was driving a car in the city of New York. The woman was driving a car in the city of New York.



The woman was driving a car in the city of New York. The woman was driving a car in the city of New York.

Duplex Truck Drives Through All Four Wheels

Self-Locking Differential Adds to Pulling Ability

GET THIS Duplex truck when you want a truck that will pull, push, turn a corner, climb and cross hills, make grades and keep going a long way. It has the most power, greatest torque, the most grip and steady motion for most jobs. It has the most of everything that makes a truck a truck. It has the most of everything that makes a truck a truck. It has the most of everything that makes a truck a truck.

The Duplex truck is a truck that will pull, push, turn a corner, climb and cross hills, make grades and keep going a long way. It has the most power, greatest torque, the most grip and steady motion for most jobs. It has the most of everything that makes a truck a truck. It has the most of everything that makes a truck a truck.

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Duplex truck with 1000 lb. capacity.

It has a capacity of 1000 lbs. and a 1000 lb. capacity. It has a capacity of 1000 lbs. and a 1000 lb. capacity. It has a capacity of 1000 lbs. and a 1000 lb. capacity.

The Duplex truck is a truck that will pull, push, turn a corner, climb and cross hills, make grades and keep going a long way. It has the most power, greatest torque, the most grip and steady motion for most jobs. It has the most of everything that makes a truck a truck. It has the most of everything that makes a truck a truck.

It has a capacity of 1000 lbs. and a 1000 lb. capacity.

The Duplex truck is a truck that will pull, push, turn a corner, climb and cross hills, make grades and keep going a long way. It has the most power, greatest torque, the most grip and steady motion for most jobs. It has the most of everything that makes a truck a truck. It has the most of everything that makes a truck a truck.

The Duplex truck is a truck that will pull, push, turn a corner, climb and cross hills, make grades and keep going a long way. It has the most power, greatest torque, the most grip and steady motion for most jobs. It has the most of everything that makes a truck a truck. It has the most of everything that makes a truck a truck.



There is nothing else like this. It is the only truck that will pull, push, turn a corner, climb and cross hills, make grades and keep going a long way. It has the most power, greatest torque, the most grip and steady motion for most jobs. It has the most of everything that makes a truck a truck. It has the most of everything that makes a truck a truck.



Cross-section of the roller bearing assembly. The roller is shown in place.



Roller bearing assembly. The outer ring (1) and inner ring (2) are shown in place.

Lubrication-Free Roller Bearing

Elimination of Sliding Friction—Solid Construction

A lubrication-free roller bearing has been developed by the General Motors Research Laboratories. The bearing is a solid unit, the rollers being of solid construction and the cage being of solid construction. The bearing is of solid construction and the rollers are of solid construction. The bearing is of solid construction and the rollers are of solid construction.

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the roller bearing assembly. The roller is shown in place.

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THE NEW BEARING

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View of the bearing for lighting operation mounted on the car.



The Readers' Clearing House



A Mid-Summer Night's Dream

ATLANTA, Ga.—Editor MOTOR AGE—
I was sleeping soundly last night, at the close of a hard day's labors, when, in my dreams, a person (shall I say, a man) appeared to me and spoke to me as follows: "As thou hast long been a true worshipper at the shrine of My Lady Gasoline, methought that possibly thou wouldst be interested in a slight insight into the future, and wouldst like to see the automobile of 1920, the car par excellence."

Upon my stating that it would afford me much pleasure to be enabled to obtain a glimpse of the ultimate car, for apparently there is little room for improvement in the present masterly creations of to-day, a large curtain rose, and I saw THE CAR, which I shall endeavor, in a few stumbling words, to describe.

In the first place, the engine was six-cylinder, having a stroke approximately two-thirds greater than the bore. The cylinders, of course, were cast in block. The pistons had five rings, three being above the pin and two below. It is, of course, useless to state that the valves were in the head. This engine had double intake and exhaust valves, thereby obtaining instantaneous admission and expulsion of the gases to and from the cylinders.

Control Automatic

The valves were mechanically operated by camshaft located upon the cylinder heads. Instead of relying upon springs to force the valves closed, recourse was had to grooves in the sides of the cams, near the outer edges, in which were working pins, or projections, on the ends of the rocker arms.

I hardly need state that the starter was electrically operated. Instead of using the makeshift push-pedals or buttons located on the footboard, recourse was had to a push button located with the remainder of the control assembly in a small, neat, compact box on the steering column immediately below the wheel. A child would thereby be enabled to start and operate the car with perfect ease; howbeit ample provision was made against accidental or malicious operation of the starter by having the starter control system interconnected with the ignition switch, which operates only in conjunction with its special key, so that the starter will remain inoperative until the ignition switch is turned on in the proper way. Provision was made for obviating danger of inadvertently operating the starter while the engine is running.

There were two spark plugs for each cylinder, located at an angle of 90 deg.

The Future Car

from each other on opposite sides of the cylinders. This caused a spark and consequent explosion at opposite sides of the cylinders at the same time. Both plugs being operated by the same magneto would, of course, necessitate the sparks in each cylinder being perfectly synchronized. This would cause instantaneous ignition of the gases, causing a much livelier engine.

The carburetor was extremely simple, having a minimum of working parts. Gasoline, kerosene, and the new invader, alcohol, the manufacture of which has been so perfected that the commercial product can be placed upon the market at a price that will enable it to successfully compete with gasoline, work equally well with this carburetor.

It is unnecessary to take up time stating that the intake and exhaust manifolds were cast integral with the cylinders.

The oiling system was the highest development of the positive force-feed system, thoroughly oiling all working parts, not only of the engine, but of the entire chassis.

The clutch was the old reliable time-tried and proved dry-plate disk, improved and refined in some few respects.

The gears were electrically operated, having four speeds forward and one reverse, controlled by push buttons located on the upper end of the steering column. The driving gear ratio was three to one on fourth, which was direct drive. This ratio, together with the extremely flexible and powerful engine, permitted speeds of from 5 to 75 m.p.h. without touching anything with the exception of the accelerator.

The spark control was automatic, being designed to work on somewhat the same general principle as the ball governor used extensively in steam engineering practice. This permitted the spark to be well advanced while the car was running at moderate speed upon the level, but, upon striking a hill, with the consequent slowing of the engine, the spark was automatically retarded, thereby eliminating the possibility of the driver forgetting to retard the spark, with the resultant pounding of the engine.

The left foot pedal combined the clutch and the external contracting brake located on the rear-wheel drums. The right foot pedal combined the internal expanding brake located upon the rear-wheel drums with the internal expanding brake located upon the front-wheel drums. This enabled all of the available brakes to be applied in

case of emergency with the feet, thereby leaving both hands free for the steering wheel, gear change, etc. The brakes on the front wheels, when used in conjunction with the rear-wheel brakes, enables the driver to make a much smoother, and, if desired, a much quicker stop than was possible heretofore.

Wire wheels were used exclusively.

The weight was reduced from 200 to 600 lb., due to further refinements in compounding steels, alloys, using aluminum pistons, etc.

So we might give a brief summary of the car as follows:

First—Multi-cylinder exponents to the contrary, the six-cylinder, valve-in-head, blockcast engine will be the logical ultimate engine.

Second—There will be three standard sizes of cars, namely, 25, 35 and 45 hp.

Third—The fuel consumption will be gratifyingly low. The large cars will average 18 to 20 miles, the medium cars 25 to 28 miles and the small cars 30 to 35 miles per gallon of fuel.

Fourth—Tires will be made in three standard sizes, to-wit, 30 by 3½ for the small cars, 34 by 4 for the medium cars and 36 by 5 for the large cars.

No Freak Designs

Motorists will demand the discontinuance of special freak designs, colors, etc., and will demand service and dependability for their tire equipment. By doing away with the multiplicity of sizes, the rubber factories will be enabled to devote their entire time, resources and ingenuity to the three sizes named, and, by producing each of these in enormous quantities will be enabled to market a much better product at a lower price.

Fifth—The average car prices will be in the immediate neighborhood of \$800, the small car being about \$600, the medium car about \$1,000 and the large car from \$1,500 to \$1,800. There will only be about a half-dozen makers marketing cars listed in excess of \$2,000.

Sixth—Conditions will be much better for the tourist, at least insofar as the license proposition is concerned. While the owner will be required to obtain his license in the commonwealth in which he resides, this license will be recognized and honored in any states in the Union, as well as in Canada and Mexico. So the tourist may travel to his heart's content without being worried by having to continually consult states' laws, secure permits, licenses, etc.

Seventh—The license rate will be in pro-

ner. Be sure and brace the seat up so it will not fall back before it is all cut out and falls down and bends the iron.—F. A. Allen.

SAXON KNOCKS INTERMITTENTLY Would Appear to Be Caused By Loose Connecting-Rod Bearing

Bidwell, Ia.—Editor MOTOR AGE—Can Ford wheels be adapted to a 1916 Saxon roadster, four-cylinder model? I would like to put on larger sized wheels, the same as 1917 model has, and as cheaply as possible.

2—My engine is inclined to overheat, especially during the hot summer months. Is there any way to increase the cooling capacity of this car?

3—I noticed an advertisement for using part of the exhaust gases, introducing the gas into the water inlet connection between the radiator and the engine. They claimed that this installation made it impossible to boil the water. Would such a device help?

4—When car is standing with engine running there is a humming noise made by something in the gear case which sounds as if the bearings in the front end of gear case were running dry, but this cannot be the cause as I have plenty of steam cylinder oil in the case. What does this noise indicate?

5—When I speed the car up a bit the engine develops a slight knock, this usually showing up on level roads after a good speed and when I am holding the throttle steady. I think there is a slight end play in the crankshaft. Could this be the cause of the knock? There is also another knock in the gears operating the camshaft. An expert tells me this is caused through the fact that at a certain point in the revolution of the camshaft the valves have a tendency to run the camshaft backward and that they hold this shaft still, causing the teeth on the gears and camshaft to clock together. What is the cause of this knock?—K. F. Clardy.

1—Ford wheels will not fit this model. However, Saxon can furnish you with larger wheels.

2—A good tinsmith can solder an extra tank onto the top tank of the present radiator. It would be a case of building a copper tank with about 1-gal. capacity which would conform with the shape of the hood, this tank to be soldered onto the radiator tank.

3—It is very probable that this device would eliminate the overheating.

4—The noise is in the timing gears. If it is merely a humming and not an excessive rasping sound, there is nothing wrong. However, if the latter condition exists the timing gears may be worn or the teeth broken and the remedy would be replacement.

5—It is unlikely that there is a knock caused by end play of the crankshaft. It is more probably due to too quick throttle opening with spark advanced, carboned cylinders, loose piston or wrist pin, loose connecting rod bearing, or some of the other various sources of knocking. The writer has seen one of these models operate in much the same manner. There was a knock which occurred on heavy pulling, but was not evident when a light load was being carried by the engine. An examination proved that the knock came from a loose connecting-rod bearing. Your statement that there is a knock in the timing gears and, in your question No. 4, that there is a hum in the front of the engine, leads us to believe that these gears are badly worn. The fact that there is a play in the gears to the extent that the valves have a tend-

ency to hold the cam bearing is further evidence that the gears are either badly worn or are out of proper mesh.

MYSTERIOUS ENGINE POUNDING Intermittent Operation of Water or Oil System Possible Cause

Quincy, Ill.—Editor MOTOR AGE—My Model 35 Studebaker has a knock in the engine. Carbon has been scraped and burnt out; compression is even in all cylinders, testing 60 lbs. in every one, within 1 or 2 lbs. thereof. Crank case has been inspected and all bearings are light. Car seems to run fine at 20 m.p.h. and will go over some hills like a racer, and then come to a smaller hill and show the knock. It is not continuous and has shown up on a level paved street and then gone over a steep hill without a sign of it. With spark and throttle advanced three-fourths on the segment, which is one-fourth farther than company states is proper. It seems to give the best satisfaction. I have about decided to retard the spark at the magneto, but thought I would like to hear from you first.—A. D. Smith.

It would appear from your explanation that either the oiling or cooling system was intermittent in its action. It may be that the lubricant reaches all parts under normal conditions but occasionally fails long enough to allow the engine to heat and a knock occur. The same thing may hold true of the water circulating system. It is suggested that you overhaul both of these systems thoroughly before retarding the spark at the magneto.

HOW OWEN MAGNETIC IS STARTED Principle of Changing Generator to Motor for Cranking

East St. Louis, Ill.—Show a wiring diagram of the 1912 Stearns Knight. Show how the voltmeter should be connected with the lights, generator and battery.

2—In the Owen Magnetic-driven car, how is the engine started without putting the car in motion?

3—Is this car being built for the market, and where?—A Reader.

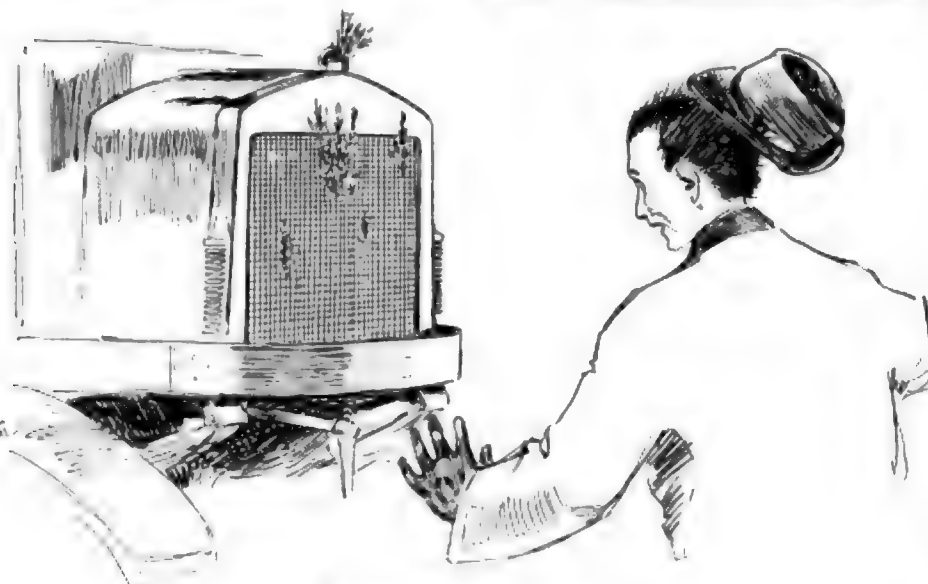
1—A complete wiring diagram of the 1912 Stearns-Knight will be published next week.

2—The field magnets and coils of the generator form the flywheel of the engine. The armature of the generator is on a shaft running free on a spigot ball bearing in the flywheel and attached at the other end through the motor, which is separate from the generator, to the drive shaft and so to the bevel pinion of the rear axle. Thus the field of the generator runs always at engine speed while the armature of the generator runs always at propeller-shaft speed. Reference to Fig. 5 will make this more clear.

The effect of running the engine and so spinning the field magnets of the generator is to induce currents in the armature which make a magnetic attraction between the armature and the field. This is equivalent to tightening the fields on the armature so that the armature tries to turn with the field and will do so if the resistance to motion of the car as a whole is not too great. This means that part of the energy in the flywheel of the engine goes to the creation of electrical currents in the armature coils, and part to the direct mechanical work of turning the armature and so driving the car.

Inquiries Received and Communications Answered

J. N. Brightwell.....Atlanta, Ga.
F. A. Allen.....Daytona, Fla.
A. D. Smith.....Quincy, Ill.
A Reader.....East St. Louis, Ill.
Emmet Wolf.....Flint, Mich.
W. L. Conrey.....Chanute, Kan.
R. F. Downs.....Washburn, Wis.
H. B. Kingsbury.....Fort Worth, Tex.
Gus Barlemaun.....Converse, Tex.
George Kirby.....Dadeville, Mo.
E. A. Campbell.....Argenta, Ark.
N. M.....Escanaba, Mich.
S. P. Coleman.....Salem, Ill.
A Reader.....Wilkinsburg, Pa.
Will Eldridge.....Memphis, Tenn.
Charles F. Smith.....Lacon, Ill.
Harold L. Johnson.....Bridgewater, Iowa



Notice War Gardeners

Hartford, Conn.—Editor MOTOR AGE—During a recent cold spell a truck radiator froze and several of the tubes burst. The owner of the truck injected about 4 lb. of kerosene to stop the leak, but instead plugged the radiator and cylinder jackets. During the process of removing the obstructions it was found that some of the seeds had sprouted.—William J. Johnson.

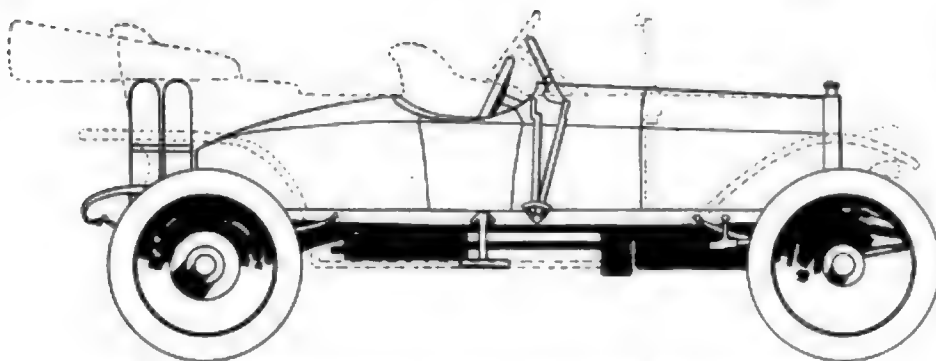


Fig. 6—How a 1909 four-cylinder Mitchell might be cut down into a speedster

motor car manufacturing houses?—Gus Barle-mann.

1—The majority have their valve seats at a 45 deg. angle.

2—Automobile Trade Directory, Inc., 243 West 39th street, New York City.

KRIT CUT-DOWN BODY DESIGN Figures On Speed Increase Gained By Larger Tires

Dadeville, Mo.—Editor MOTOR AGE—Publish a diagram showing a Krit stripped as a speedster. How much would 32 by 3½ tires speed up a Ford stock car?

2—How could I hang a Ford engine in a Krit frame?—George Kirby.

1—A diagram of a Krit cut down is shown in Fig. 7. It is impossible to give an accurate estimate of the speed increase which would be brought about by the use of these larger tires. However, the following data will give you an idea. This considers that the engine will turn the same maximum number of revolutions with the larger tires as with the small ones, which is, of course, impossible. Suppose the Ford is geared 4 to 1 and has 30 in. tires. When this car is traveling 45 m.p.h. the engine is revolving 1763 times a minute. Now leave the gearing the same and put on 32-in. tires. With the engine turning over 1763 r.p.m. the car will travel between 47 and 48 m.p.h.

2—The engine supports, gearsets, etc., are of such different specifications that it would be a procedure of prohibitive expense.

CADILLAC OILING SYSTEM LAYOUT Illustration and Description of 1910 Model Lubricating Method

Argenta, Ark.—Editor MOTOR AGE—Publish a description and diagram of the oiling system on the 1910 Cadillac, four-cylinder engine. —E. A. Campbell.

The lubrication of this engine is by automatic splash. It takes care of the five crankshaft bearings, the connecting-rod and camshaft bearings, cylinders, pistons, etc.

Refer to Fig. 9. The crankcase is divided by walls A into four compartments. In the bottom of each compartment there is a depression or well, B. The crankcase should always contain sufficient oil so that each of these four wells will be from three-fourths to entirely full and so that the splashers, C, which are attached to the connecting rods, will dip into the supply and throw the oil over the parts to be lubricated.

On the left side of the engine there is a lubricator tank or reservoir which receives the fresh oil. In this lubricator there is a double-acting force pump. One movement of the pump plunger forces the oil through the feed pipe up to the sight feed on the dash. The oil drops to the bottom of this sight feed and from there is drawn by the other movement of the pump plunger and forced to the third compartment of the crankcase to maintain the supply there.

As before stated, the splashers at the lower ends of the connecting rods throw the oil all over the inside of the engine and that which is not used in lubricating drains down the inside walls and into the sloping troughs D at the side. These troughs carry the oil from one compartment to the other so that the supply is maintained uniformly in each.

The adjustment for the oil supplied to the crank case should be so regulated that the quantity in the wells will be maintained as before mentioned. The supply is governed by the length of the stroke of the plunger of the lubricator pump. The longer the stroke of the pump plunger, the more oil is forced through the feed pipe.

On the top of the lubricator, on the plunger, there are two notched collars. The upper one is the adjusting collar attached rigidly to the plunger. The lower one is the locking collar. To adjust the stroke of the plunger, first loosen the locking collar. Then to increase the supply of oil, turn the adjusting collar to the right (screw it down). Doing this gives a longer stroke to the plunger. To decrease the supply of oil, turn the adjusting collar to the left (screw it upward). Doing this short-

ens the stroke of the plunger. After making an adjustment, be sure to lock it with the locking collar.

USUAL ENGINE COMPRESSION SPACE Average Crankshaft Offset and General Gear Progression

Wilkinsburg, Pa.—Editor MOTOR AGE—What is the usual compression space in engines?

2—How much is the crankshaft set off center of cylinder and are most engines set off center?

3—What is the general gear ratio of intermediate and low speed and how much power is lost by having them driven by side gears? —A Reader.

1—The usual compression space in engines is from 40 to 35 per cent on the piston displacement. This gives a mechanical compression ratio of between 4.3 and 3.8, or a compression pressure of between 90 and 76 lb. per sq. in. absolute.

2—When the cylinder is set off center it is anywhere from ¼ to ½ in. Most engines are set on center.

3—The gear reductions vary according to the characteristics of the engine. Low, intermediate, and high are generally in, or approximately in, geometric progression. Take a specific case of a three-speed gearbox. The ratios are 3.24 to 1 on low, 1.66 to 1 on intermediate, and 1 to 1 on high gear. This would, of course, be multiplied by a rear axle gear ratio, which may be 4.5 to 1, making the total reductions on low, intermediate and high, 14.5, 7.47, and 4.5. The efficiencies throughout the entire transmission system are about 97 per cent on high, 90 per cent on intermediate, and 80 per cent on low gear.

MOTOR SCHOOLING COURSE GOOD Subjects Outlined, Together With Practical Experience, Good Training

Escanaba, Mich.—Editor MOTOR AGE—I have a Buick 1917 or 1916 light six, D-45 model. Would it be advisable to equip it with 35 by 4½ or 34 by 4 in. cord tires?

2—Explain how I could attach an oil gage similar to that on the Hundred-point Kissel six, that is a rod extending into the oil, the level being registered on it, much the same principle as putting a stick into water to see how deep it is.

3—Should a Rayfield model GL2C carburetor be hot water jacketed?

4—If the Rayfield GL2C carburetor should be hot water jacketed, would you explain how it should be done?

5—What is the highest r.p.m. of the D-45 Buick, and what N.A.C.C. horsepower does it develop?

6—Why do the Buick valves require frequent regrinding, and how can I tell when a piston is on the compression or firing stroke?

7—Would counterbalancing the crankshaft help, and who makes the necessary parts?

8—What particular college course would be advisable if one entered the motor car business? What would MOTOR AGE think of a mechanical, electrical, and chemical course with industrial management and business administration of about seven years? What would one's opportunities be then?—N. M.

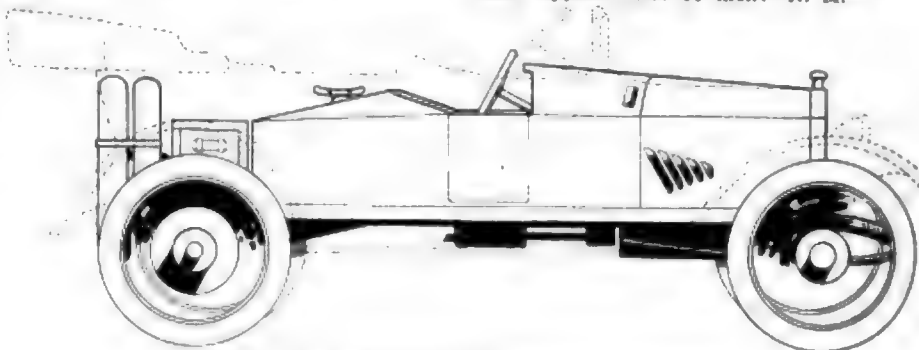


Fig. 7—Krit built over with modern speedster body

the 1980s, the company has been able to maintain a strong presence in the market, despite the challenges posed by the economic downturn.

The company's success can be attributed to its innovative marketing strategies and its commitment to customer service.

In the future, the company plans to continue its growth and expansion into new markets.

The company's financial performance has been strong, with a steady increase in revenue over the past several years.

The company's management team is experienced and has a proven track record of success.

The company's products are of high quality and are well-received by customers.

The company's marketing efforts have been highly effective, resulting in a significant increase in sales.

The company's commitment to innovation and customer service has been a key factor in its success.

The company's financial performance is a reflection of its strong management and marketing strategies.

The company's future prospects are bright, and it is well-positioned to continue its growth.

The company's success is a testament to its dedication to excellence and its commitment to its customers.

The company's financial performance is a testament to its strong management and marketing strategies.

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THE FUTURE OF THE COMPANY

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MOTOR AGE

45¢

CHICAGO, APRIL 26, 1937

Volume 17

JOHNSON'S PREPARED WAX IN THE NEW LIQUID FORM *LIQUID FORM*

Your Car Is Judged By Its Finish

If the finish is kept in good condition, the finish itself will stand up to the most severe conditions. Johnson's Prepared Wax is the best way to keep your car's finish in the best of condition.

JOHNSON'S PREPARED WAX

Johnson's Prepared Wax is the best way to keep your car's finish in the best of condition. It is the only wax that will stand up to the most severe conditions.

Johnson's Wax Form

Johnson's Prepared Wax is the best way to keep your car's finish in the best of condition. It is the only wax that will stand up to the most severe conditions.

Johnson's Prepared Wax is the best way to keep your car's finish in the best of condition.



Apply with
Cloth—
Brush
or Spray



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is constantly
improving its
products.
Van Sicklen
products are
standard.

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Set the Speed Recording
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MOTOR AGE

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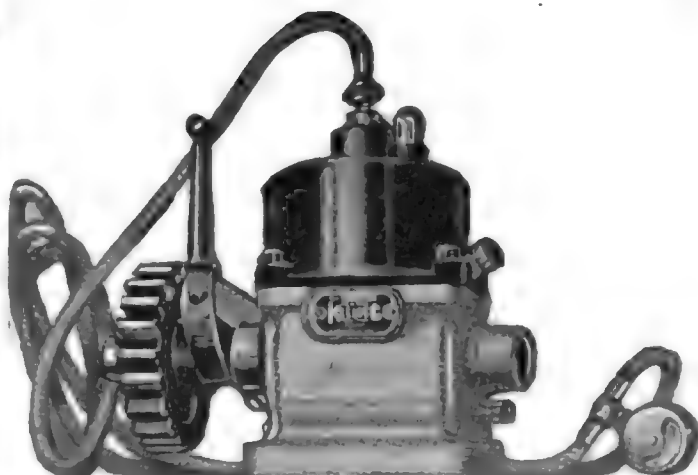
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ANNOUNCEMENT

The weaknesses of American and foreign cars in war service will be the feature of Motor Age for next week. The story is the result of a critical study of motor cars and trucks on the Italian front made by our special European correspondent, W. F. Bradley, while he was in the Italian ambulance service.



Superiority!

The Superiority
of the

KELLOGG
Engine Driven
Tire Pump

is acknowledged by the

34 Leading

Motor Car Manufacturers

who use it in preference to all others as *Standard Equipment* for the convenience of their car owners.

The Necessity

of the equipment is at the same time acknowledged by these manufacturers.

*Is your car fully
equipped without it?*

*Are you satisfied to be
without this equip-
ment?*

*Is it on the new car
you expect to buy?*

Your Dealer can bring your old car up-to-date by making the installation!

KELLOGG MFG. Co.

ROCHESTER, N. Y.

Detroit Toledo San Francisco Chicago Indianapolis

Because Studebaker Dealers
were able to offer the car
of greatest value

Arkansas

showed an increase
of 113.2% in 1916

LOCAL conditions varied throughout Arkansas—each individual dealer had his own problems to work out, his own sales restrictions to effect.

Studebaker VALUE solved their problems; Studebaker VALUE men then decided their aims.

They wanted new models with the Sales 17 Studebakers.

The Sales 18 Studebakers are even better than the Sales 17, for they are fully thirty distinct improvements of

refined construction, convenience and comfort.

They have them subject to a price of greatest protection.

If you want to multiply your profits to 1917—if you want to "make 19" on the investment demanded by the new Sales 18 Studebakers—investigate the Studebaker proposition now.

STUDEBAKER

Frank Hill

Frank Hill, Inc.

Indianapolis, Ind.

STUDEBAKER SALES CO.

It pays to be a **Studebaker** dealer



While the New Age movement reflects its roots in spirituality, it does not mean that people who practice it believe in magic and witchcraft.

the spiritual journey, as people find meaning and purpose in their lives. It is not about magic and witchcraft, but about the human experience and the search for meaning. The New Age movement is a spiritual journey, not a religion. It is about the human experience and the search for meaning.

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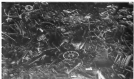
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What Is a Witch?

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Not all the new age spiritual practices are magic. Witchcraft is the New Age religion.

Spring explains, at least partly, the offering made by the Jordan Motor Car Co. in color schemes, for this time of the year above all others quickens the taste for color. Only twenty-five cars are offered to be finished in any color or any combination of colors that the purchaser's personal preference may choose. Ten color schemes are presented to help in making a choice. The tones that sound so tuneful of spring are among them. The idea is much like that of the fashionable milliner or dress-maker, who, while perfectly willing to produce anything a customer may call for, suggests several well-considered designs as aids to choice. The principle of the plan is good. In many cases a prospect confronted with an opportunity to select any color in the world will be absolutely at a loss which way to turn, but a timely suggestion will get him started and will help him crystallize his ideas.

An added incentive lies in the knowledge that only twenty-five cars will be sold under the plan. Each purchaser will have the highly gratifying consciousness of possessing a car that is not likely to be mistaken for any other car. None of the color schemes are to be out of harmony; they are effective—and tasteful for all their dash and splash.

E. A. BUYS NEWTONE

New York, April 23—The E. A. Laboratories, Inc., accessory maker, has bought the business of the Automobile Supply Mfg. Co., maker of Newton horns, together with its patents, trademarks, good will, unfilled contracts and orders on hand. The plant of the Newton concern has been sold to Louis Leavitt, a Brooklyn paint maker, who paid \$137,500 plus incidental expense.

The Automobile Supply Mfg. Co. started manufacturing the Newton horn in 1904. The company will be remembered for its participation in the suit brought against it in 1904 by the Lovell-McConnell Co., maker of the Klaxon, when it was charged with having infringed the Miller Reese Hutchinson patents.

TO STUDY FOREIGN MARKETS

New York, April 23—Tom O. Jones of Indianapolis, Ind., has been chosen to investigate the motor markets in the Far East for the Bureau of Foreign and Domestic Commerce of the Department of Commerce. Before sailing he will visit the principal motor car centers in this country to familiarize himself with the export problems of the manufacturers with headquarters at 409 Custom House, New York. His foreign study will include China, the East Indies, Africa and Australia.

Mr. Jones has been in the export and American motor car business for several years and made a previous trip to the Far East for an American motor car concern.

Fly at Chicago Speedway

Race Oval Will Train Aviators and Chauffeurs for the Army

Wright Biplane and Sturtevant Are in Equipment

CHICAGO, April 24—Within another month the Chicago speedway will be the Campus Martius, not the Circus Maximus, of the city. Officials of the Chicago speedway, aiming to make the local course the American Brooklands and as valuable to our military authorities as is the English track to the war lords of Briton, already have established an aviation school there and now announce that they will use the tamarack oval for the instruction of army chauffeurs.

The school for military drivers is somewhat of an innovation. The course consists of lessons by correspondence in motor car mechanics, followed by practical application of this knowledge on the speedway. Dario Resta has been offered the position of chief instructor and, if he accepts, will choose his assistants from the galaxy of race drivers that now are awaiting the call to the colors.

Students in the military chauffeurs' school will be taught how to drive a car at high speed and on graduation are expected to be so well versed in the car that when in the field they will be independent of the garage if a tire or wheel must be changed, a carburetor adjusted or faulty ignition corrected, work that must be done quickly and sometimes under fire.

Several students already are enrolled in the aviation school, which opened Saturday. Hangars have been built, and the equipment now includes a Wright biplane and a Sturtevant-motored machine. William V. Skall, who rode as mechanic with Frank Galvin last season, has been appointed chief instructor. He is an aviator of five years' experience and at the present time is subject to call from the Imperial Royal Flying Corps of Canada. Tharis Weiner is his assistant, and the construction work and mechanical department is in charge of Frank Pontkowsky, an airplane maker.

The course at the Chicago speedway aviation school consists of ten preliminary lessons, costing \$100. When these are finished, the student may qualify for a pilot's license in the Aero Club of America by 4 hrs.' continuous flying. There is an additional charge of \$150 for this.

OPENS CLEVELAND OFFICES

Cleveland, Ohio, April 21—The Standard Parts Co. has opened executive offices here. The forces in charge at the factories, which include the plants of the former Perfection Spring Co., Standard Welling Co.,

Western Spring & Axle Co. and the Bock Bearing Co., are not affected directly by the opening of these headquarters, however. They will remain unchanged for the most part.

The offices of President Christian Gird; Dan C. Swander, general sales director; J. G. Utz, director of engineering; Horace H. Newsom, director of purchases; J. H. Liston, manager of the jobbing department; E. R. Finkenstaedt, assistant to the president; and James A. Bradden, special publicity, will be at Cleveland. An auditor, yet to be appointed, will complete the executive office personnel. Secretary P. A. Connolly will have his headquarters at the Perfection Spring Division plant still.

The Standard Parts Co. is now one of the largest makers of parts for motor vehicles in the industry and includes springs, axles, rims, tubular parts, bearings, etc., among its products. Its twelve factories employ 8000 persons and a working capital of about \$22,000,000.

EMPIRE INCREASES PRICES

Indianapolis, Ind., April 23—The Empire Automobile Co. will advance the price on its model 70 light six \$50 May 1.

BILL RETURNS TO CHALMERS

Detroit, April 23—Harry L. Bill has returned to the Chalmers Motor Co. as works manager. In 1909 he was in the engineering and experimental departments of the Chalmers company, and it was largely due to him that the Chalmers racing team was awarded the championship by the A.A.A. contest board that year. Mr. Bill, since leaving Chalmers, has been factory manager for the Disco Starter Co., general manager and director of the Hayes Mfg. Co., and vice-president and general manager of the Springfield Metal Body Co. Though only thirty-five years old he has been identified with the industry for seventeen years and is one of the best known men in the industry. He has been responsible for several innovations in the way of modern methods of quantity production and is recognized as possessing special ability along these lines.

MANLY ANNOUNCES NEW PRICES

Chicago, April 23—The Manly Motor Corp. has announced the following list of prices to take effect May 1: Model 30, 1½-ton, \$1,800; Model 50, 2½-ton, \$2,250; kerosene burning equipment, \$100; electric starting and lighting, \$125; electric lighting only, \$75; inclosed cab in place of seat, \$35. The concern has moved its offices from Chicago to its factory at Waukegan, Ill.

MAXWELL ECONOMY DAY

Detroit, April 20—The Maxwell Motor Car Co. has fixed May 23 as national economy day when \$5,000 in cash prizes are to be distributed among dealers and the National Maxwell Economy Championship Cup is to be awarded.

Owners' cars only will be used. The dealers must agree to arrange for the use of two Maxwell five-passenger touring cars now in owner's service, which he is to borrow for the day. The two cars will make the run together, each carrying four full-grown passengers, including the driver and three official observers. Two 1-gal. gasoline tanks will be provided each participant and will be attached to the windshield. Every report will bear the affidavits of the three observers. The prizes will be: First prize, \$200 in gold; second prize, \$150; third, fourth and fifth prizes, \$100 each; sixth and seventh prizes, \$75 each; eighth, ninth and tenth prizes, \$50 each.

JOE DAWSON WITH CHALMERS

Detroit, April 21—Joe Dawson, racing driver, has joined the Chalmers Motor Co. as assistant experimental engineer, with special duties in the new contest and trial section of the advertising department. Dawson won the 500-mile contest at Indianapolis in 1912 and won an heroic name for himself in the Hoosier classic of 1914 when he risked his life to avoid hitting Lino Bonani, the mechanic of the overturned Isotta car. Dawson has been connected with the Marmon company in its engineering department.

MONROE INCREASES CAPITAL

Pontiac, Mich., April 24—The Monroe Motor Co., has increased its capital stock from \$1,000,000 to \$2,000,000. The matter of par value on this stock has not been settled as yet. The board of directors is increased from five to seven. The two new directors are both distributors of Monroe cars, one being William Small of Indianapolis, Ind., and the other L. S. Frint of Milwaukee, Wis.

The price of the car is increased from \$985 to \$1,095 on Models M-4 touring and M-5 club. The price on the small models remains \$565 for the roadster, \$635 for the club and \$965 for the sedan.

The Monroe stock is held quite closely and it is believed that the additional \$1,000,000 will be absorbed quietly without an extensively advertised public sale.

The company is in a prosperous condition at the present time. Fifteen of the new M-4 touring cars are being put out a day and about ten of the small models, making a total of twenty-five. This will be increased after the first of May to a total of thirty-five cars. The Monroe Motor Co. recently took in the plant of the Auto Top & Trim Co. of Pontiac and owns in addition its engine plant in Port Huron, Mich.

PRINCESS PRICES INCREASE

Detroit, April 21—The Princess Motor Car Corp. has announced an increase in the price of its models from \$775 to \$825, effective May 1. The five-passenger touring car, three-passenger roadster and four-passenger club are affected.

Auto Derby Is Assured

Chicago 250-Mile Event for
\$21,000 Purse Will Be
Held June 16

Entry Blanks Are to Be Mailed
This Week

CHICAGO, April 20—After a month of impatient waiting and enforced inactivity, due to the declaration of war, Chicago's third annual Auto Derby is assured, and it will be held on the Chicago speedway, June 16. This is a week later than originally intended but will give the officials an opportunity to postpone the derby to June 23 if rain spoils the earlier date. The race will be for 250 miles with a purse of \$21,000, the first ten drivers to finish dividing \$20,000 and \$500 going to the leader at the end of 100 and 200 miles.

Entry blanks will be sent out next week, the ticket agencies already are being established in and around Chicago. There will be 1000 of these. The scale of prices is: Box seats, \$10, \$8 and \$7; grandstand chairs, \$5, \$4 and \$3.50; bleachers, \$1.50 and \$1; parking space, \$10 and \$5; and paddock, \$2.

President David F. Reid is confident that the war preparations will not interfere with the success of the derby. The drivers and mechanics who have volunteered for military service either as airplane pilots or chauffeurs of armored cars probably will not be called to the colors until the middle of the summer, it is believed.

CINCINNATI GETS RACERS

Cincinnati, Ohio, April 23—Cincinnati is going ahead with arrangements for its big race of the year, May 30. Among the drivers who have promised to take part are Josef Christiaens, Enrico Cagno and Jack Scales, all of whom are now in Europe, Eddie Rickenbacher, Ralph de Palma, Louis Chevrolet, Earl Cooper, Fred Ducommun and, according to the management, Dario Resta, who was declared recently to be out of the racing game.

Detroit, April 23—Barney Oldfield has entered for the Uniontown speedway race of May 10 and will enter for the Cincinnati speedway race of May 30. He will drive his old Delage.

HIGH-PRICED CAR SHORTAGE

Detroit, April 20—Although at this time the Government has made no demands on the manufacturers of high-priced cars, it is anticipated that there will be a serious shortage of that class of motor car by the early fall. Labor already is being diverted to farming and munitions manufacturing purposes, and the scarcity is being felt at Detroit. In addition, it is expected that the Government will demand the highest

quality of materials in all motor products manufactured for it and as a consequence will produce a shortage of cars ranging in price from \$2,000 up. Car makers who have large stock of parts and materials on hand are congratulating themselves, and several, it is rumored, who are not so fortunate, already have been obliged to reduce their output. Data on the situation is not yet available, since the Government has not specified its complete requirements. It is expected that another thirty days will reveal how much of a shortage may be expected this fall.

DE PALMA MFG. CO. REORGANIZES

Detroit, April 21—Ralph de Palma has disposed of his interest in the De Palma Mfg. Co. and will race this year on his own account. He will continue to act in an advisory capacity to the company, however. The officers now are: President, Frank Book; vice-president, Herbert Book; secretary and treasurer, C. W. Toles. In addition to rebuilding de Palma's old Mercedes car and two other racers it will make engines for airplanes.

AMATEUR RACES MAY 30

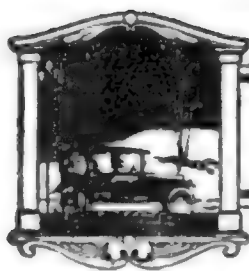
Cincinnati, Ohio, April 23—With the award of the May 30 date to the Cincinnati speedway many requests for an amateur drivers' race were received by the officials, and a program of three amateur races is being planned. The first will be for cars costing less than \$1,000; the second for cars between \$1,000 and \$1,500 in value; and the third for cars costing more than \$1,500. Prizes will be offered in each event, and the races will precede the 250-mile race. Another feature in preparation is an aviation exhibition.

FORD DEMURRER OVERRULED

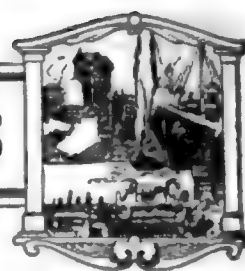
New York, April 23—Henry Ford was defeated in the Federal court to-day in the suit for libel brought by the Vitagraph Co. of America, asking for \$1,000,000 damages for Mr. Ford's utterances, which the court held cast discredit on the film "The Battle Cry of Peace." The court overruled the demurrer filed by Mr. Ford's attorneys and granted a motion of the plaintiff for judgment on the pleadings. At the same time the court gave the defendant twenty days to file an answer. The suit is the outgrowth of an article entitled "Humanity and Sanity," which was given currency by Mr. Ford last May and in which he made certain observations on motion pictures which the Vitagraph company alleged were direct condemnation of one of its films.

TO OPEN MARQUETTE PLANT

Saginaw, Mich., April 23—The meeting in Saginaw of W. C. Durant and associates held last week will result in the opening of the large factory building formerly occupied by the Marquette Motor Works. This information is based upon a positive statement made by Mayor H. T. Paddock of Saginaw.



EDITORIAL PERSPECTIVES



Lest Haste Make Waste

THERE is one feature connected with the hasty assembling of armies in a crisis like this due primarily to lack of proper preparedness and sure to militate in the end against the best interests of a country, from a military standpoint. In the effort to raise a large army and greatly increase our naval forces and other direct arms of the national defense we may overlook the proper mobilization of the brain and other factors. This particular feature is not one that applies to motorists as a whole: in all probability to the average motorist service can be given directly to some arm of the military forces. It does, however, apply to the motor industry as a producing unit. The industry has two major tasks ahead of it. The first of these is the complete provision of army transports; the second is the manufacturing of airplanes.

THE most important is the need for the right men at the head of organization. True, we are fortunate in having at the head of the national advisory council, and similar committees, the biggest and best brain of the industry. It is also true that the Government is working in close harmony with these men, but we are in danger of suffering, as the English suffered during the early part of the war, from too many commissions and committees that duplicate each other's efforts, interfere with each other—even working against each other for public approval. After muddling for a long time, England finally picked from her industry a few big men, who organized themselves and the industry, and to-day transport for the army in England is handled, and handled well, by the brains of the motor industry. But England lost many months of valuable time in getting this arm of the service into united action.

FRANCE, too, suffered from a similar difficulty. One instance which shows how men are enlisted at the expense of brain power and expertness is recorded in the following news note. It is reported herewith and carries its own comment. It is a comment that could be heeded to advantage in our own country.

Paris, March 9—Leon Ventou-Duclaux, editor of the commercial vehicle paper *Le Poids Lourd*, secretary to the Technical Laboratory of the Automobile Club of France, engineer, chemist and author of many technical works on motor engineering, died recently, aged 36, as the result of sickness contracted on the French front.

Ventou-Duclaux, who before the war was responsible, with Lieutenant Lumet, for the Technical Laboratory of the Automobile Club of France, held the military value of a private in the artillery. As such he was sent to the Front on the outbreak of war but after a year's service under severe conditions was discharged from the fighting forces, suffering from bronchitis. After recovering somewhat he was given a position for which he was eminently suited in the airplane motor test department of the French army. Here he worked with another motor journalist and engineer, Charles Faroux, also serving as a private. While testing motors under very severe weather conditions a few weeks ago, Ventou-Duclaux contracted a chill, which in his weakened condition developed into pneumonia and proved fatal.

The death of Ventou-Duclaux is an example of the weakness of the military system, which continues to give to fully developed men the military value they possessed when youths of twenty. By reason of his comparatively poor physical development, Ventou-Duclaux ranked, according to the military scale of values, as an indifferent artillery private. In civil life he stood at the head of his profession and was a most valuable member of the community. By putting him into the field the army gained little and has lost a man who could have been as useful to its technical service as he was to the automobile industry of France.

Our Motor Resources

AS pointed out on this page two weeks ago, America has vast resources in its millions of motor cars which may, in case of need, be utilized in some way or other for the benefit of the government, chiefly in transportation. However, we are likely to become over-enthusiastic on this score, and assume that, on account of there being more quantity of vehicles which may be placed at the disposal of the Government, we have a wonderful transport medium.

SUCH, however, is not the case. That these cars potentially are valuable cannot be denied, but we have a tendency to exaggerate that. On this subject also we can turn to England's experience for a lesson. When Great Britain started the war, she had a mixed aggregation of vehicles of all sort, in all conditions of repair and non-repair and of all ages and styles. Her troubles were frequent and woeful. The only excuse for the great amount of labor required to put these used cars into any state of reliability, which would permit of their perform-

ing efficient service, was the great emergency that existed then. Hundreds of trucks which had been operating in daily service for private firms were thrown into the junk heap after they had been taken to the place of mobilization. Some of them when worked on every day would run, but to keep such a truck in a column, where a breakdown meant a complete tieup of traffic, for perhaps 5 miles to the rear, rendered their use almost an impossibility.

IT IS fortunate for America that at the present moment there is no urgent need for a vast aggregation of transport facilities. Army heads calculate on having a supply of trucks large enough for the troops that are ready for movement. As fast as the army can be raised, and put in shape for service, new trucks can be produced in quantities sufficient to care for them. The reliance for mobilization of troops on trucks now in commercial service or private motor cars now in the hands of owners is a mistake.

America Now Needs Trained Drivers

Plenty of War Trucks—Few Operators and Few Roads

AMERICA finds itself in the extraordinary condition of being able to supply more trucks than there are drivers to operate them. This was forcibly brought out in a recent address by Joseph E. Husson, editor the Commercial Vehicle, before the editorial conference of the Trade Press Association in New York.

According to Husson, war finds us prepared in motor trucks, unprepared in personnel to operate them and sadly unprepared in roads over which they can be run. There are approximately 250,000 motor trucks of all classes and sizes in use in the United States to-day in all lines and all classes of business. The total present output of motor trucks of all kinds is close to 700 per day, although not all of these are suitable for war service. Six of our truck makers can supply 100 trucks suitable for army needs a day, under present manufacturing conditions, and this output can be almost doubled by them should the necessity arise. Our government already has something over 2000 trucks which it purchased for use with the Mexican expeditionary force. These are all available and most are ready for active service on the moment. Yet only 11.3 per cent of our 2,451,660 miles of roads are surfaced and can possibly be used for truck work every month of the year.

Taking a leaf out of a lesson book of the European nations, it is not the intention of our government to commandeer indiscriminately the trucks of private users, especially those engaged in industrial work, which the experiences of the war abroad have proved of as vital moment to successfully carrying on a campaign as it is to have the army supplied with everything it needs for actual work in the field.

Novices in Preparedness

We are still novices in preparedness work as compared with the nations abroad and we must take the advice of the special commissions which France and Great Britain are sending to our shores. We are the richest nation in the world, with the greatest resources, and yet we are not quite certain how we shall use these to the best advantage. To avoid the mistakes made abroad we must make haste slowly and avail ourselves of the experience of Great Britain, whose position was most nearly like that of our own at the outbreak of the war.

One of these lessons which the War Department has already learned is indicated by its intention not to confiscate civilian motor trucks for war work, but to purchase trucks from the makers and in this manner avoid paralyzing our industrial transportation. Our truck makers stand

ready to meet this demand, whatever it may be. Civilian trucks will not be used according to present plans except in cases of necessity in districts local to those in which they are ordinarily engaged.

One of our greatest problems in connection with the motor transportation needs of the army is to obtain competent motor truck drivers. To secure such men from among the ranks of the present-day drivers will tend to paralyze the efficiency of our industrial truck work, which is just the thing which should not be done.

Training Camps for Drivers

To secure competent drivers from among the ranks of the passenger car owners and chauffeurs and to train novices would seem the most likely method, yet even this would require a considerable amount of training. It would be necessary to establish training camps in various parts of the country in which truck driver applicants might be trained first hand in driving trucks over all sorts of roads. The training necessary for a motor truck driver in army service requires considerably more knowledge and

experience than that possessed by the average passenger car driver, as shown by the results of our Mexican expeditionary force. These men must be trained to keep their vehicles in convoy formation, to extricate their trucks from mires in bad roads, to perhaps run at night without lights over unknown stretches of roads and perhaps to keep their seats in the cab for 24 hr. at a time.

In suitable roads for military service we are sadly lacking, especially throughout the great Mississippi valley, which is the greatest grain-producing area in the Western Hemisphere. This huge territory is practically barren of usable roads on which trucks could operate 12 months of the year. Should this great agricultural valley be attacked from the south across the Mexican frontier, motor trucks would be positive necessities.

Due to the fact that the railroads do not run up to the guns, it would be imperative to handle the ammunition by motor transportation. The gigantic size of this problem can be realized when on the French front it requires a fleet of 480 trucks to handle enough ammunition to feed the big guns for 2½ hr. In Italy, twenty-four motor trucks are needed continuously to supply ammunition for one large gun. From this it may be seen that practically preparedness means permanent roads, and that while our makers can furnish a sufficient number of trucks and while drivers may be trained to drive them, they will be practically useless unless we have permanent every-day-in-the-year roads over which they can be run.

PREDICTS STEAM AIRPLANE

Detroit, April 20—Abner Doble, vice-president of the General Engineering Co., believes that steam as a motive power for airplanes may be used in the near future. The powerplant of the Doble steam car, which is manufactured by the General Engineering Co., develops 1 hp. to 10-lb. weight, which is a better ratio, according to Mr. Doble, than that of a complete powerplant of a gasoline car and when used in an airplane is not encumbered with clutch, change speed transmission and starting apparatus and the ratio of weight to power is greatly reduced.

Mr. Doble is experimenting on his powerplant for aerial purposes in an endeavor to reduce the weight and expects to lighten the boiler and engine by careful adaptation of design and the use of special materials. The electrical apparatus may be eliminated virtually by taking advantage of the draft supplied by the propeller and the velocity of the plane.

Enlistment Guide

FOR MECHANICS, TRUCKMASTERS, AVIATORS, MOTOR CAR DRIVERS, ETC.
HEADQUARTERS

Governor's Island, New York
States

New York	District of Columbia
New Jersey	West Virginia
Pennsylvania	Virginia
Delaware	Canal Zone
Maryland	Porto Rica

Boston, Mass.

All New England States
Charleston, S. C.

North Carolina	Tennessee
South Carolina	Mississippi
Georgia	Coast Defenses at
Alabama	New Orleans
Florida	Galveston

Chicago

Ohio	South Dakota
Kentucky	Missouri
Michigan	Iowa
Indiana	Kansas
Illinois	Nebraska
Wisconsin	Wyoming
Minnesota	
North Dakota	Colorado

Fort Sam Houston, Tex.

Texas	Oklahoma
Louisiana	New Mexico
Arkansas	Arizona

San Francisco, Cal.

Washington	California
Oregon	Nevada
Idaho	Utah
Montana	Alaska

OFFICER ENLISTMENTS

Aviators, airplane designers, engine designers, inspectors, etc., wishing to enlist as officers should apply to the Quartermaster General at Washington, D. C., who will direct them to their respective quartermaster's offices, after passing on their applications. Aviators will be enlisted in the Aviation Section of the Enlisted Reserve Corps in the grade of a corporal or sergeant. Engineers will be enlisted in the Engineers' Corps.



Fitting Defense for Democracy

SANE PREPAREDNESS is the FENCE about our FARM called GOVERNMENT.

It protects the PLOW of AMBITION, keeps the SOIL of SOCIETY smoothly furrowed and allows the SEEDS of INDUSTRY, LITERATURE and SCIENCE to GROW undisturbed, fearless of destruction, CERTAIN OF CULTIVATION.

Universal military training is this fence.

THE United States MUST have ample PROTECTION. It must be a protection suited to a DEMOCRATIC NATION—NOT based upon the theories of other countries whose armies are inherited from ancient days.

Our army should be a useful one in times of peace, doing constructive work, FIGHTING to make our country a better one, READY to FIGHT against other countries if need be.

Other nations have armies for the welfare of the rulers. AMERICA MUST HAVE AN ARMY FOR THE WELFARE OF ITS PEOPLE.

Standing armies of vast numbers who live idly and pleasantly while the masses struggle to sustain them are king-supporting institutions.

THAT is the old system of Europe. The United States wants none of it.

This nation does NEED a great army of men who can RESPOND quickly to the call to arms and who WILL BE FAMILIAR with them.

AND IT NEEDS YOUR SUPPORT to obtain it.

YOU MUST help to secure universal military training which is the ONLY DEMOCRATIC PREPAREDNESS.

Universal training is provided for by Congress Senate Bill No. 1695, known as the Chamberlain Bill. It is a bill that will:

Provide training for every able man for six months of his nineteenth year.

Instruct every man how to PROTECT this nation.

Insure the complete disappearance of slackers.

Give to America a vast army READY at ALL TIMES, yet able in time of PEACE to engage in INDUSTRY, ART, SCIENCE and other beneficial pursuits.

Provide against the heavy cost for sustaining a large standing army.

Guarantee the **RESPECT** of **ALL OTHER NATIONS**.

Develop the **MANHOOD** of the American boy.

Produce **HEALTHY** American citizens.

Instill discipline into the mind of all Americans.

Foster patriotism and love of these United States.

IT WILL DO A THOUSAND PROFITABLE, SUBSTANTIAL, BENEFICIAL THINGS. IT WILL MEAN THE DISAPPEARANCE OF THE EVILS OF THE ANCIENT STANDING ARMY SYSTEM.

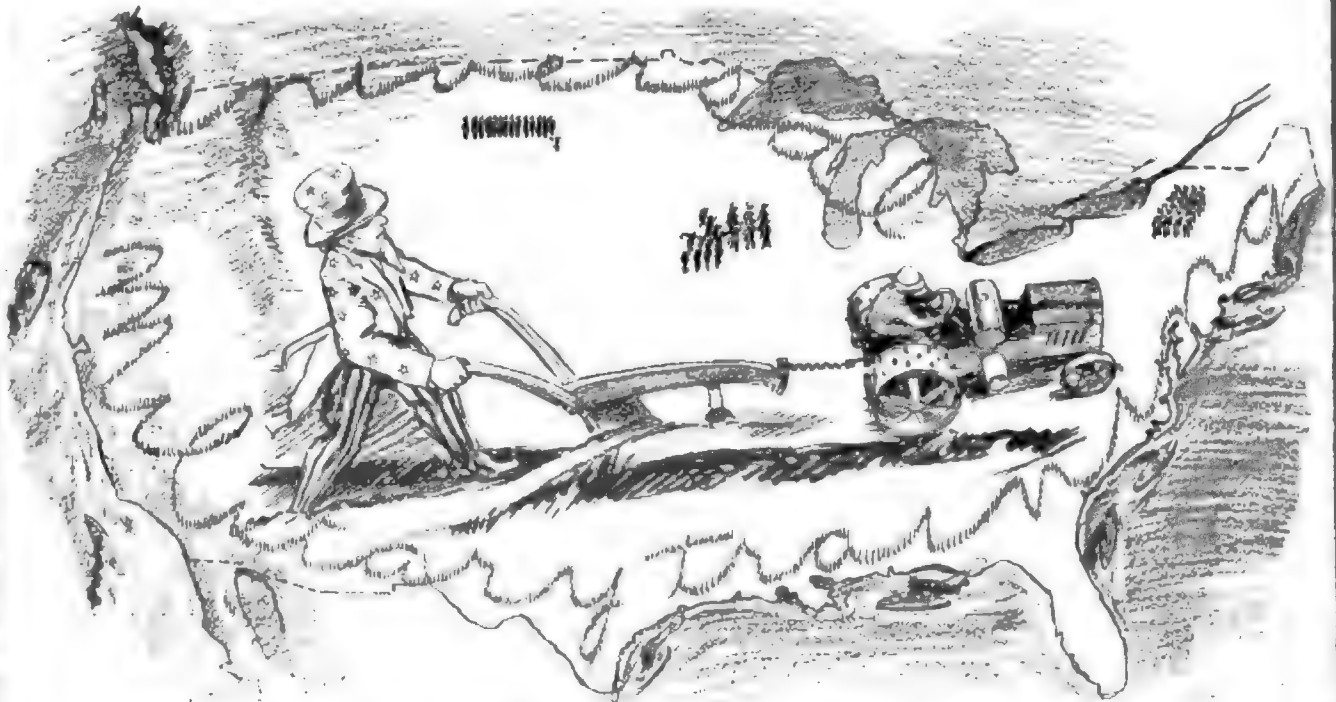
BUT—TO GAIN THE PASSAGE OF THIS BILL—YOU MUST ACT. YOU MUST AWAKEN TO THE IMPERATIVE NEED FOR SPEEDY PREPAREDNESS—TO THE OVERWHELMING DANGERS THAT THREATEN ALL DEFENSELESS NATIONS—TO THE FACT THAT OUR COUNTRY IS NOW—AT THIS VERY MINUTE—TODAY—AT WAR—and that its INSTITUTIONS, IDEALS, PRINCIPLES, CITIZENS and MATERIAL WEALTH are AT STAKE, and DEMAND AN IMPREGNABLE DEFENSE.

AND YOU MUST VOICE YOUR APPROVAL OF THIS BILL FOR UNIVERSAL MILITARY SERVICE EMPHATICALLY BY LETTER OR TELEGRAM TO YOUR SENATOR AND CONGRESSMAN.

We would pity the stupidity of a tiger who, attempting to escape from a gorilla, would jump from a mountain top.

Unless we—and that includes YOU—use **SPEED** and **COMMON SENSE** as we face the perilous times that **NOW** confront us, we may discover that we have jumped from the **MOUNTAIN TOP** of **LIBERTY** to the valley of lost ideals, misery and ruin.

We MUST be prepared to defend **OUR IDEALS, OUR LIBERTY, OUR PRINCIPLES, OUR CITIZENS**—and **WE MUST** make our **DEFENSE** as **DEMOCRATIC** AS **OUR NATION**.



at least once the rate of 100 miles per hour, and that the car had broken down and stopped in the roadway.

The man in custody is being held here for the investigation of the accident, which occurred near the intersection of the highway and a local road. The man is being held for the investigation of the accident, which occurred near the intersection of the highway and a local road. The man is being held for the investigation of the accident, which occurred near the intersection of the highway and a local road.

Officer said there is no other vehicle involved in the accident, which occurred near the intersection of the highway and a local road. The man is being held for the investigation of the accident, which occurred near the intersection of the highway and a local road. The man is being held for the investigation of the accident, which occurred near the intersection of the highway and a local road.

THE SEARCH FOR BIRD PROTECTION

How many birds are there in the world? The answer is not known, but it is estimated that there are about 10 billion birds in the world. The search for bird protection is a complex task that involves many factors, including the environment, the birds themselves, and the people who care for them.

Prest-O-Lite Co. Is Sued

Commercial Insurance Co. Sues
Injunction and Damages
Re: Insurance

Notice to the Honorable Court
Re: Injunction and Damages

The Commercial Insurance Co. is suing the Prest-O-Lite Co. for the amount of \$100,000. The Commercial Insurance Co. is suing the Prest-O-Lite Co. for the amount of \$100,000. The Commercial Insurance Co. is suing the Prest-O-Lite Co. for the amount of \$100,000.

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IN A SEARCH FOR BIRD PROTECTION

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made into a dry, if not a warm, bedroom. Meals may not arrive with the same regularity as to the men in the heavy artillery and other semi-stationary services but the motor driver, being unlimited in his carrying capacity, need not go hungry if the ordinary supply fails, as is often the case with the men in the trenches.

Motor drivers endeavor, as far as possible to get some building, or at any rate some wreckage of a building, which they can regard as home. There is remembrance, for instance, of men attached to motor searchlights, which every evening were taken up to positions among their own trenches to flash a light across the enemy's lines. They had to live near their "work," and the best location was discovered in a wrecked farm which had reserve trenches under and around it and barbed wire in its disreputable courtyard. Those windows looking on to the enemy's lines were boarded up one night, so that no man would be tempted to look out and thus attract the attention of the guns. Two rooms were found to be fairly dry and were equipped with bedsteads made of trestles with wire netting spread across them. When hay is thrown across this, a bed is formed on which a tired soldier can always pass dreamless hours. The courtyard was large enough to house the cars, and with branches of trees laid across them during the day, there was little danger of their being spotted by airplanes.

Drivers' Home Comforts

Another group picked out the ground floor of a picturesque little cottage with a clear rippling stream in front of it. The fact that there was a mortuary on the right and an army coffin maker on the left did not cause them to hesitate in their choice. But after one night they moved out, declaring that they could not face being eaten alive by rats. During the summer months at any rate many drivers of trucks and ambulances make a rule of sleeping aboard their vehicles. The practice simplifies life considerably, for there are no quarters to seek, no fear of getting another man's bunk and no insects or animals to disturb the peacefulness of the night.

NEW ACCESSORY ASSOCIATION

Atlantic City, N. J., April 23—An organization of manufacturers of automotive electric accessories has been formed here, and it will be known as the Automotive Electric Association. The purpose of the organization is to improve and develop this branch of business through standardization and friendly interchange of experience with reference to design and manufacture. The officers are: President, G. Brewer Griffin, Pittsburgh, Pa.; vice-president, C. O. Mininger, Toledo, Ohio; secretary, G. S. Cole, Cleveland, Ohio; and treasurer, C. L. Amos, Syracuse, N. Y. The next meeting will be at Hot Springs, Va., May 17-19.

Owen Magnetic in Film

Motion Pictures Help Demonstrate Operation of System at Meeting

Electric Power Cited as Advantage to Railroad

NEW YORK, April 20—A description of the operation of the system of the Owen magnetic transmission formed the subject of last night's paper before the Metropolitan Section of the Society of Automotive Engineers. The speaker was Walter S. Goll, who has charge of manufacture of the transmission at the Fort Wayne plant of the General Electric Co. The description of the method of operation of the transmission was very lucid and was illustrated by lantern slides showing diagrams of the car which have several times been published in *MOTOR AGE*, together with details of the electric circuits on the different speeds.

At the conclusion of the paper a series of motion pictures was shown, which demonstrated very clearly the special virtues of the magnetic transmission. They showed the car climbing a stiff grade at a very low speed; how it could be allowed to run backward and then be stopped and moved forward again slowly by closing and opening the throttle. Another series showed the wheel climbing over a large rock, and it was noticeable that the action was so smooth and general that practically no bounce occurred, although the stones in question must have been at least a foot high.

In opening the discussion, Mr. Potter of the Chicago, Milwaukee & St. Paul railroad spoke on the advantages of electric power in railroad work. He said that the operation of railroads in mountainous country had been completely revolutionized by the electric locomotive. Two particular advantages were to be noted. First, the electric engine operates more efficiently when it is well cooled, which means that its power increases in winter and decreases in summer, exactly the reverse of what happens with steam locomotives. At the same time, the rolling resistance of a train is greater in winter than in summer. With steam power the weight of the train must be cut down in winter, but with the electric power a balance is struck automatically, which enables the same size of train to be operated winter and summer.

COOLING FAN NEGLECTED

Cleveland, Ohio, April 21—Design and capacity of the cooling fan are not given the attention they deserve, according to A. K. Schanze, who addressed the Cleveland section of the Society of Automobile Engineers last night.

Mr. Schanze pointed out very clearly the necessity of unrestricted and ample water-jackets, especially in motors using the thermosiphon cooling system. He also stated that in a number of motors which had come under his supervision that the circulating pumps and radiators were of such designs that the water was all pumped out of the bottom of the radiator, so that for short intervals of time there was really no circulation taking place in the motor, until the water had again reached the bottom of the radiator, at which point the pump was located.

The author then discussed radiator cooling fans, their pulleys and bearings. He stated that in order to cut the cost of radiator manufacture, do away with objectionable noises and trouble, better fans should be used. He stated that in his experience he had found the multi-blade fan far more powerful and efficient than any fan yet produced, as it produced far more breeze at much less power consumption.

At the conclusion of the paper Louis Schwitzer, production manager of the Empire Automobile Co., Indianapolis, Ind., took exception to this statement. He said that in road tests the flat-blade fan had been found much more satisfactory. He substantiated his statements with several figures.

Stephen Jeneclik, Climax Motor Devices, Cleveland, said the reason for Mr. Schwitzer's statement was the fact that the multi-blade fan was so much more efficient that it delivered far more air than could escape from behind the radiator and under the hood. Mr. Jeneclik also stated that there was plenty of very excellent data available for fan design, and that it still remains a question for the motor car designer to decide as to the amount of air necessary, available radiator space, etc. These given, the fan and radiator manufacturers would have definite specifications to work upon.

Excerpts from Mr. Schanze's paper will appear in an early issue.

STEGEMAN INCREASES CAPITAL

Milwaukee, Wis., April 23—The Stegeman Motor Car Co. has increased its capital from \$100,000 to \$200,000. The following changes in personnel have been made: L. G. Schertl, secretary-treasurer and sales manager, with Oscar Stegeman remaining president and F. W. Apel appointed assistant sales manager. The directors include Oscar Stegeman, Frank H. Parker, vice-president, L. G. Schertl, Frederick Gettelman, Faustin Prinz, Adam Mayer and C. P. Bossart.

WISCONSIN MOTOR RESERVE

Milwaukee, Wis., April 21 — A motor transport reserve as a part of the Wisconsin national guard is being established under the auspices of the Wisconsin State Automobile Association, which intends to enlist from 15,000 to 25,000 private owners in the state to pledge their cars and services of themselves or their drivers to give the Wisconsin infantry a mobility that is possible only with motor vehicles.

As soon as a sufficient number of pledges have been received, the reserve will be organized formally. The administration will be in the hands of a council of five. In each city or village, a transport company with one captain and two lieutenants will be organized. The plan contemplates placing a company in each place where there is a militia organization. The salient idea

is facilitation of troop movements, which may be hampered through unforeseen contingencies, such as the destruction of railroad bridges, or other emergency which might halt railroad traffic.

Membership in the reserve is open to every motor car owner in the state. The intention is to form squadrons of the same make and model of certain cars, for the sake of uniformity in repairs. Each company is to have a repair car attached to it.

FORD TRACTOR MAN INDICTED

New York, April 20—W. Baer Ewing, president of the Ford Tractor Co. of Minneapolis, New York and elsewhere, has been indicted under the Ohio Blue Sky Law on the charge of offering stock for sale in his company without a license. Ewing's enterprise has been under investigation by the vigilance committee of the Associated Advertising Clubs of the World, which some time ago issued a report citing some unfavorable facts about the organization and conduct of the company.

TIRE FRAUD ORDER ISSUED

Akron, Ohio, April 21—The postmaster-general has issued a fraud order against the Double Service Tire & Rubber Co. and Carl F. Geyer, Akron, Ohio, and the successor of this company, the Champion Rubber Co., Akron and Barberton, Ohio. The former concern was charged with selling as new a defective motor car tire, which was made by placing a new thin tread over an old tire or by combining two old worn tires, frequently purchased from junk dealers.

Carl F. Geyer is now under sentence of twenty-one months in the Atlanta penitentiary on conviction of fraud. Wilmet A. Nash, Mark B. Miller and Max S. Glover also were indicted in the same case. Nash was fined \$500; Miller entered a plea of guilty and is now awaiting sentence, while the indictment against Glover is pending.

The evidence showed that the only articles manufactured by the Champion Rubber Co. were fifteen toy balloons. Stock of the Double Service Co. was sold through the Bankers' Underwriters Association of Chicago, a concern against which a fraud order has been issued. Numerous instances were revealed where tires guaranteed to run 7000 miles gave a service varying from 8 to 300 miles.

TRACTOR MEET IN AUGUST

Fremont, Neb., April 21—The Fremont tractor demonstrations, which have been designated as the national tractor demonstrations, will be held Aug. 6-18.

HUDSON TEAMS AT CINCINNATI

Detroit, April 21—The Hudson Motor Car Co. has entered two Hudson super-six cars for the Cincinnati 250-mile race of May 30. Ralph Mulford and Ira Vail will drive. If the third car is finished in time it will be entered and driven by Billy Chandler.

Gasoline Report at Last

After Two Years' Work Commission Fixes Blame on Standard

Legislation to Meet Conditions Is Recommended

WASHINGTON, D. C., April 24—The long-deferred report of the Federal Trade Commission on the price of gasoline was transmitted to the Senate to-day and the finding of the commission is that Standard Oil interests substantially dominate the gasoline industry—refining, pipeline transportation and marketing.

The commission's report suggests "in view of the variation of the product now sold as gasoline that only such petroleum products as contain a certain proportion of reasonably volatile elements shall be sold in interstate commerce as gasoline."

Despite dissolution of the so-called "oil trust" by the Supreme Court, the commission concludes that Standard Oil domination has had a "fundamental bearing" on gasoline prices, declared to have been arbitrarily increased.

In an exhaustive report of its investigation, under resolutions of Senators Gore and Owen of Oklahoma and its statutory authority, the commission declares, in substance, that real competition does not exist between the various Standard Oil companies because of interlocking stock ownership through the holding of a majority of shares in the constituent Standard companies by identical interests.

Legislation to meet these conditions is recommended by the commission. Also its evidence and findings have been transmitted to the Attorney General for appropriate action. The principal findings of the commission are:

That in a majority of marketing territories the Standard companies are dominant.

That the several Standard companies have maintained a distribution of territory in the marketing of gasoline and that no substantial competition in the chief petroleum products exists among the several Standard companies.

That this absence of competition is due to a community of stock ownership.

That the facts disclose such advances in prices of gasoline and such differences in price corresponding to Standard marketing territories as are not possible of explanation apart from the foregoing conditions.

The commission has not found conclusive evidence of collusion among the various Standard companies in violation of the dissolution decree.

That the combination of pipe lines with the other branches of the industry has tended to establish and perpetuate monopoly.

That gasoline has deteriorated in quality, a variety of products being sold under that name.

Recommendations of the commission include:

A law providing for the reopening of anti-trust cases on the application of the Attorney-General by a bill of review for the purpose of securing such modifications of decrees as new conditions may require.

Abolition, by legislation, in certain cases, of common stock ownership in corporations which have been members of a combination dissolved under the Sherman law.

Effective limitation upon common ownership of stock in potentially competitive corporations by withdrawing the power of voting and control.

Legislation which, while recognizing common ownership, would fix upon such common owners the responsibility for the acts of each of the several companies so owned, which prevent competition.

Segregation of the ownership of the pipe lines from the other branches of the petroleum industry.

Fixing, by Congressional legislation, of standards for gasoline.

Federal collection and publication of accurate statistics and information regarding the industry.

Urges Reopening of Case

In detail, the commission urged that when it finds, as in the case of the gasoline industry, an antitrust dissolution decree has not restored competitive conditions Congress might amend the Trade Commission act to authorize and direct the Attorney-General to reopen the case for review as to the efficacy of a dissolution decree. In such proceedings it is suggested that the commission's findings should be admissible evidence and that the courts should have power to make new decrees to insure competition.

Factors in Standard Oil domination cited in the Commission's report were:

Division of gasoline marketing into eleven territorial divisions, at least nine of which are said to be dominated by various Standard Oil companies.

Stockholders of the several Standard companies are, to a great degree, the same individuals or interests, more than half of the stock of the various companies being in the same hands. Moreover, the report states that leading Standard officers often hold considerable amounts of stock in two or more companies.

Standard Oil refineries produced more than 60 per cent of gasoline produced in 1915, sold about 65 per cent of the total marketed and held more than 70 per cent of gasoline stocks.

How Prices Soared

"Correspondence of the difference of prices (in 1915)," the commission's report says, "with Standard marketing territories, itself points to arbitrary price-making. But the arbitrary character of the inequalities in price is conclusively demonstrated by the facts that as between most of the territories there were no such differences in demand and supply. . . and the margin between cost and price was widely different in the different territories."

Wholesale prices rose between 75 and 85 per cent in 1915, according to the commission's report, and retail prices also soared. Only a part of the advance was declared due to increased demand and scarcity, the demand increasing 38 per cent in 1915 and the production but 7 per cent less. Very large profits were earned, as shown by the books of the companies and by enhanced stock market value of oil securities.

Tours from the Hoosier Capital

Week-End and Holiday Trips from Indianapolis

FOUR of the major cross-country highway converge at Indianapolis, the Hoosier metropolis and capital, which make it one of the main touring centers of the Middle West. Indianapolis is America's largest city not on navigable water. Located almost in the geographic center of Indiana, Indianapolis has a network of roads radiating from it which make the state probably the most accessible from a motoring standpoint of any in the Union. Indiana roads rank high in quality and quantity as well. From Indianapolis the tourist can begin many trips of one-, two- and three-day length and be sure of finding good gravel, macadam, concrete or brick roads practically the entire distance.

Before outlining the various tours out of Indianapolis, just a word of what the city itself has to offer is in order. It has 2000 acres of parks, mostly connected by a boulevard system, a speedway for motor racing which is the only one of its particular kind in this country, and is or has been the home of a number of illustrious men such as Vice-president Charles W. Fairbanks, James Whitcomb Riley, "the Hoosier poet," Meredith Nicholson, novelist, and others of note. Soldiers and Sailors monument, where for years the governor's residence was located, is in the exact center of the original city and from it four avenues radiate to the four quarters of the city. Here are some of the trips that may be taken with Indianapolis as the starting point:

To Crawfordsville—This trip measures 92 miles and takes the motorist through Clermont, Brownsburg, Pittsboro, Lizton, Jamestown, New Ross and Whitesville to Crawfordsville, returning the same way.

To Cincinnati—This is a very scenic trip through winding hills a part of the way. The distance for the round trip is 233 miles, by way of Hawthorn, New Palestine, Carrolltown, Fountaintown, Morristown, Arlington, Rushville, Connersville, Evart, Blooming Grove, Brookville, Cedar Grove, New Trenton, Harrison, Valley Junction, Cleves, North Bend, Sekitan, Addyston, Fernbank, Home City, Delhi, Trautman, Anderson's Ferry, Riverside, Sedamsville to Cincinnati.

To Terre Haute—This is a tour of 140 miles for the round trip over gravel and macadam roads, following the National Old Trails route. The cities en route are Bridgeport, Plainfield, Bellville, Stilesville, Mount Meridian, Putnamville, Manhattan, Peelsville, Harmony, Brazil and Seeleyville to Terre Haute. This is a very interesting trip over rolling country.

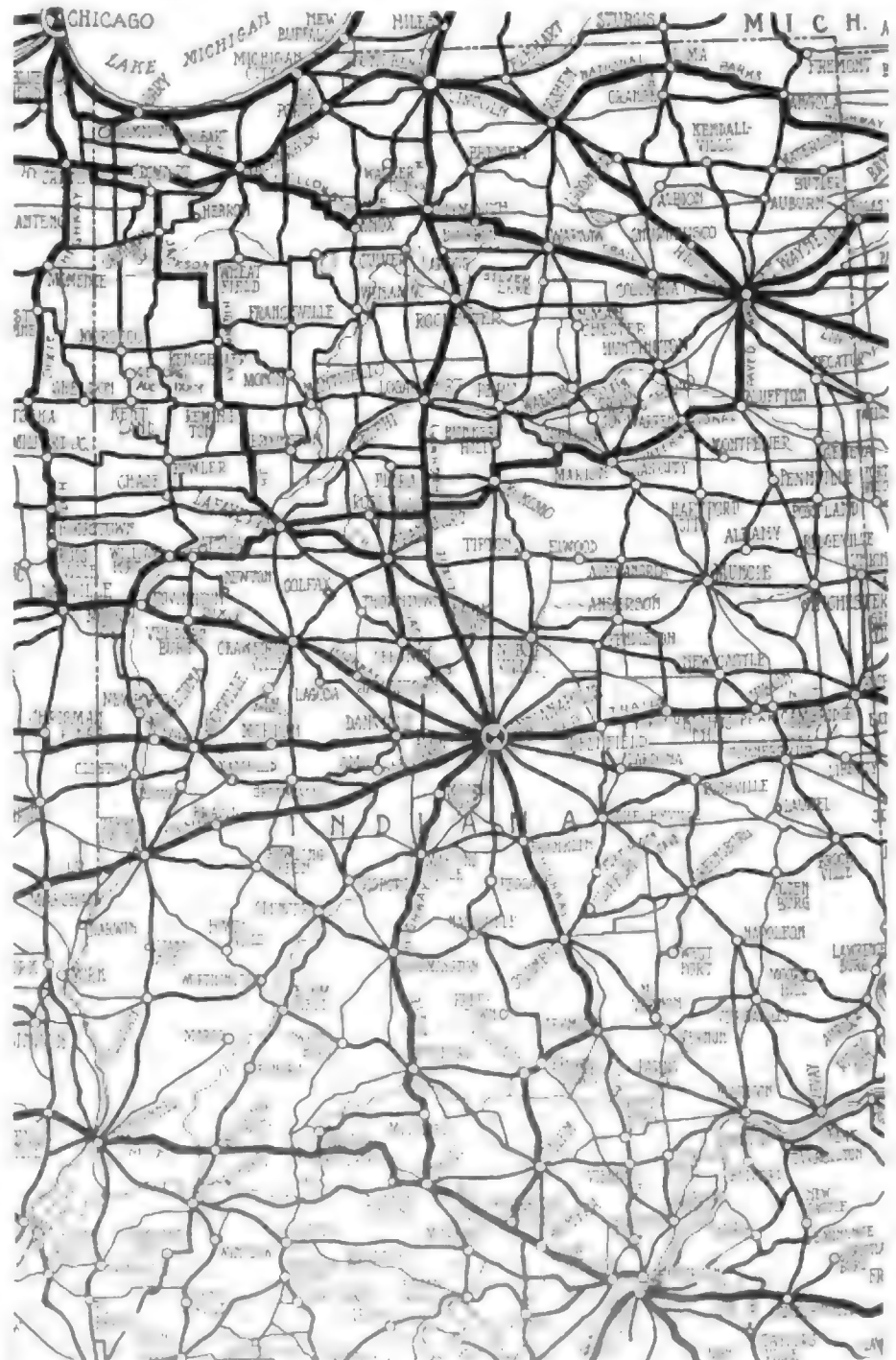
To Kokomo—This is a round trip of 102 miles going through Broad Apple, Carmel and Westfield. It takes one through farm-

ing country that is typical of the Hoosier state. Another way of reaching Kokomo from Indianapolis is by way of Noblesville, the route being through Allisonville, Noblesville, Cicero, Arcadia, Atlanta, Tipton and Sharpville. The round trip over this route is 118 miles.

To Marengo Cave—The route to Marengo Cave is 136 miles each way, good gravel or macadam all the way and very

scenic. The cave is said to rival the Mammoth cave in Kentucky, being recognized as the most beautiful cave in the Middle West. The route goes through Greenwood, Franklin, Amity, Taylorsville, Columbus, Bedford, Mitchell, Paoli and Valeene to Marengo.

To The Shades—The objective of this trip is one of Indiana's most picturesque summer resorts. One route lies through



Indianapolis is the hub of numerous touring possibilities, an idea of whose extent a glance at the map gives

Danville, Bellmore, Rockville and then north to The Shades, or northwest to Lebanon, then west to Crawfordsville and south to The Shades.

To Louisville—This is a good two-day tour, following the Jackson highway to Seymour, then southwest to Vallonia, south to Salem to Palmyra and then through Galena to New Albany and Louisville. This suggested route is better than trying to follow the Jackson highway all the way, that is from Seymour through Scottsburg and Memphis. The total distance is about 150 miles each way.

To Fort Wayne—This is a very popular over-Sunday tour of 241 miles. The route is through Brightwood, Lawrence, Oaklandon, McCordsville, Eden, Pendleton, Anderson, Alexandria, Marion, Mount Etna, Huntington and Boonoke to Fort Wayne. On this trip the Jalapa Indian hunting grounds should be visited.

To Wawasee Lake—This is a good week-end trip of 267 miles through Allisonville, Noblesville, Clare, Elwood, Mount Vernon, Wabash, Urbana, North Manchester, Col-

lamer, North Webster to Syracuse and Lake Wawasee. Here is good fishing and boating and a very enjoyable place to spend Sunday. Return over the same route.

To Attica and Mudlavia—This is a trip of 79 miles one way, taking the tourist through Crawfordsville, known as "the Athens of Indiana." The towns en route are Clermont, Lixton, Mace, Crawfordsville, Elmdale, Wingate, Newton, Attica, Kramer and Mudlavia. The Mudlavia baths possess rheumatism curative properties.

To Newcastle—This trip measures about 50 miles each way, varying a little according to the options taken. The towns en route are Cumberland, Philadelphia, Greenfield and thence to Newcastle by way of Maxwell, Maple Valley, Shirley and Kennard, or by way of Cleveland, Charlottesville, Knightstown, Ogden and Dunreith to Newcastle. Roads are good macadam and the scenery along this route is attractive.

Next Week—Detroit as a Center of Week-End and Holiday Tours.

Answers to Route Information Inquiries

Saco, Mont.—Glacier Park—Osakis, Minn.

OSAKIS, Minn.—Editor *MOTOR AGE*—Give best route from Saco, Mont., via Glacier National Park, via Yellowstone Park to Osakis, Minn.; also state mileage.—Henry A. Hanson.

From Saco proceed to Ashfield, Bowdon, Malta, Wagner, Coberg, Savoy, Harlem, Zurich, Chirook, Havre, Kremlin, Rudyard, Bison, Galata, Shelby, Virden, Seville, Browning, Glacier Park, Belton, Kallispell, Rollins, Elmo, Ronan, Ravalli, Missoula, Drummond, Hall, Anaconda, Gregson Hot Springs, Butte, Twin Bridges, Sheridan, Ruby, Virginia City, Ennis, Hutchins Ranch, Lake P. O., Yellowstone, through Yellowstone Park, out at Cody, Wyo., Ralston, Powell, Warren, Fromberg, Laurel, Billings, Huntley, Pompeys Pillar, Custer, Forsyth, Rosebud, Hathaway, Miles City, Terry, Fallon, Mildred, Ismay, Westmore, Plevna, Baker, Marmarth, N. D., Rhame, Bowman, Scranton, Gascoyne, Reeder, Bucyrus, Hettlinger, Gavnes, Butte, S. D., Petrel, N. D., Lemmon, S. D., Thunder Hawk, Morristown, Watauga, McIntosh, Tatanka, McLaughlin, Wakpala, Mobridge, Selby, Java, Bowdle, Ipswich, Aberdeen, Griton, Andover, Bristol, Webster, Waubay, Twin Brooks, Millbank, Big Stone City, Ortonville, Minn., Brown Valley, White Rock, Fairmount, Tenney, Elliott, Nashua, Elbow Lake, Thoraborg, Erdahl, Evansville, Brandon, Alexandria, Nelson, Osakis. This trip would approximate 2,000 miles.

Jackson, Mich.—Hutchinson, Kans.

Greensburg, Kans.—Editor *MOTOR AGE*—Give best route from Jackson, Mich., to Hutchinson, Kans. Also address of one or two automobile route books. C. C. Raymond.

From Jackson, Mich., proceed to Parma, Albion, Marshall, Battle Creek, Augusta, Galesburg, Kalamazoo, Paw Paw, Lawrence, Watervliet, Riverside, Benton Harbor, St. Joseph, Stevensville, Baroda, Gullen, Three Oaks, New Buffalo, Michigan City, Ind., East Gary, Miller, Gary, Calumet, Hammond, South Chicago, Chicago, Lockport, Minooka, Morris, Dwight, Pontiac, Lexington, Normal, Bloomington, Lincoln, Williamsville, Springfield, Litchfield, Mt. Olive, Staunton, Edwardsville, Marysville, Collinsville, East St. Louis, St. Louis, Mo., St. Charles, Wentzville, Wright City, Warrenton, Fulton,

Columbia, Midway, Rochepot, New Franklin, Booneville, Arrow Rock, Marshall, Grand Pass, Waverly, Lexington, Wellington, Independence, Kansas City, Overland Park, Lenexa, Olathe, Edgerton, Ottawa, Agricola, Waverly, Emporia, Cottonwood Falls, Elmdale, Florence, Peabody, Walton, Newton, Halstead, Hutchinson, Kans.

Vols. 4 and 5 of the Automobile Blue Book, published by the Automobile Pub. Co., 910 S. Michigan Ave., Chicago, contain complete running directions for this trip; price \$3.00 each.

George, Iowa—Los Angeles, Cal.

George, Iowa—Give best route from here to Los Angeles, Cal.—John DeNeul.

From George, Iowa, go to George, Matlock, Sheldon, Boyden, Hull, Rock Valley, Inwood, Canton, Beloit, Fairview, Beresford, Hawarden, Akron, Westfield, Sioux City, Oakland, Omaha, Fremont, Ames, North Bend, Schuyler, Richland, Columbus, Duncan, Grand Island, Shelton, Kearney, Odessa, Overton, Lexington, Cozad, Gothenburg, North Platte, Sutherland, Paxton, Ogallala, Brule, Big Springs, Chappell, Lodge Pole, Sunol, Sidney, Potter, Kimball, Bushnell, Pinebluff, Egbert, Cheyenne, Buford, Laramie, Bosler, Lookout, Medicine Bow, Ft. Steele, Rawlins, Wamsutter, Red Desert, Tipton, Point of Rocks, Rock Springs, Green River, Bryan, Granger, Evanston, Castle Rock, Coalville, Gorgea, Salt Lake City, Garfield, Grantsville, Josepa, County Well, Fish Springs Ranch, Ibapah, Schelbourne Pass, Ely, Eureka, Austin, Fallon, Hazen, Wadsworth, Derby, Reno, Truckee, Alta, Colfax, Roseville, Sacramento, Woodbridge, Stockton, Tracy, Livermore, Oakland, San Francisco— from which point go down the coast via inland route through Fresno and Bakersfield to Los Angeles. The inland route is most preferable at this time on account of road construction now in course on the coast route.

Vol. 5 of the Automobile Blue Book, published by the Automobile Blue Book Publishing Co., 910 S. Michigan Ave., Chicago, contains complete running directions for this trip.

Macomb, Ill.—Geraldine, Mont.

Macomb, Ill.—Editor *MOTOR AGE*—Give route from here to Geraldine, Mont. I prefer a southerly route.—Ross Elwell.

From Macomb, Ill., proceed to Bushnell,

Abingdon, Galesburg, Henderson, Rock Island, Davenport, Ia., Durant, Iowa City, Oxford, Marengo, Grinnell, Colfax, Des Moines, Redfield, Monteith, Mladon, Omaha, Elkhorn, Waterloo, Fremont, Richland, Grand Island, Kearney, Lexington, North Platte, Ogallala, Big Springs, Lodgepole, Sidney, Bushnell, Pinebluff, Wyo., Burns, Cheyenne, Chugwater, Wheatland, Orin Junction, Douglas, Glenrock, Casper, Los Cabin, Thermopolis, Worland, Manderson, Basin, Otto, Burlington, Cody, Ralston, Warren, Fromberg, Billings, Laurel, Park City, Columbus, Merrill, Big Timber, Livingston, Bozeman, Three Forks, Helena, Great Falls, to Geraldine.

We would refer you to the Automobile Blue Books published by the Automobile Blue Book Pub. Co., 910 S. Michigan Ave., for running directions of this trip.

Aberdeen, S. D.—Kallispell, Mont.

Conda, S. D.—Editor *MOTOR AGE*—Give outline of trip from Aberdeen, S. D., to Roundup, Lewistown, back to Bozeman, Butte, Missoula, then to Dixon, Kallispell, to Great Falls, back to Havre, to Minot, Ellendale and back to Aberdeen.—A. E. Eke.

From Aberdeen, S. D., proceed to Mobridge, Lemmon, Marmarth, Miles City, Billings, Roundup, Lewistown, Columbus, Livingston, Bozeman, Three Forks, Butte, Deer Lodge, Drummond, Missoula, Dixon, Polson, Kallispell. Ship your car from Appar over to Glacier Park Station. Proceed to Cut Bank, Choteau, Great Falls, Loma, Havre, Malta, Glasgow, Williston, Minot, Devils Lake, Grand Forks, Casselton, Vargo, Valley City, Jamestown, Aberdeen.

We would refer you to the Automobile Blue Books published by the Automobile Blue Book Pub. Co., 910 Michigan Ave., Chicago, for complete running directions of this trip.

Columbus, Ga.—Los Angeles, Cal.

Columbus, Ga.—Editor *MOTOR AGE*—Would like to know best route from here to Los Angeles, through New York.—Theodore Chase.

From Columbus, Ga., proceed to Cataula, Hamilton, Chipley, LaGrange, Atlanta, Druid Hills, Decatur, Ingleside, Clarkston, Stone Mountain, Snellville, Grayson, Between, Monroe, Athens, Neese, Ila, Franklin Springs, Royston, Hartwell, Ga., Browns Ferry, Anderson, S. C., Greenville, Greer, Spartanburg, Converse, Compens, Gaffney, Blacksburg, Grover, Kings Mountain, Charlotte, Harrisburg, Concord, Kannapolis, China Grove, Salisbury, Spencer, Lexington, Thomasville, High Point, Jamestown, Greensboro, Graham, Mebane, Hillsboro, Durham, Bragtown, Stem, Oxford, Stall, Bullock, N. C., Clarksville, Boydton, South Hill, Kenbridge, Blackstone, Petersburg, Manchester, Richmond, Ashland, Coatesville, Mantico, Chilesburg, Partlow, Snell, Spotsylvania, Fredericksburg, Falmouth, Mountain View, Garrisonville, Dumfries, Occoquan, Lorton, Accotink, Alexandria, Washington, D. C., Beltsville, Laurel, Baltimore, Kingsville, Bel Air, Churchville, Aberdeen, Havre de Grace, Perryville, Charlestown, Elkton, Md., Newark, Del., Wilmington, Marcus Hook, Chester, Toll-gate, Norwood, Toll-gate, Darby, Philadelphia, Bustleton, LaTrappe, Langhorne, Pa., Trenton, N. J., Lawrenceville, Princeton, Kingston, Franklin Park, New Brunswick, Metuchen, Rahway, Elizabeth, Jersey City, Weehawken, New York City, St. George, Port Richmond, Graniteville, Howland Hook, Elizabeth, Springfield, Summit, Basking Ridge, Bernardsville, Chester, Washington, Easton, Allentown, Kutztown, Kirbyville, Reading, Reinholds, Denver, Ephrata, Mechanicsburg, Lancaster, Gettysburg, Blue Ridge Summit, Waynesboro, Hagerstown, Md., Clear Spring, Indian Springs, Hancock, Cumberland, Frostburg, Grantsville, Keyser, Ridge, Addison, Pa., Somersfield, Farmington, Hopwood, Uniontown, Brownsville, West Brownsville, Centerville, Healdsville, Washington, Clayville, West Alexander, Elm Grove, W. Va., Wheeling, Bridgeport, Ohio, Cambridge, Zanesville, Jack-

sonville, Newark, Granville, Columbus, Springfield, Vandala, Richmond, Ind., Eaton, Richmond, Centerville, Germantown, Cambridge City, Dunreith, Knightstown, Greenfield, Indianapolis, Danville, Rockville, Lyford, Clinton, Centenary, Jacksonville, Paris, Ill., Grandview, Ashmore, Charleston, Mattoon, Shelbyville, Pana, Nokomis, Hillsboro, Litchfield, Mt. Olive, Staunton, Edwardsville, Marysville, Collinsville, East St. Louis, St. Louis, Mo., St. Charles, Wentzville, Wright City, Warrenton, Fulton, Columbia, Rocheport, New Franklin, Booneville, Arrow Rock, Marshall, Grand Pass, Waverly, Lexington, Wellington, Levasy, Independence, Kansas City, Overland Park, Kan., Lenexa, Olathe, Edgerton, Ottawa, Waverly, Emporia, Cottonwood Falls, Elmdale, Florence, Walton, Newton, Halstead, Hutchinson, Nickerson, Sterling, Lyons, Great Bend, Larned, Kinsley, Dodge City, Cimarron, Garden City, Deersfield, Lakin, Kendall, Syracuse, Coolidge, Holly, Colo., Granada, Lamar, Hasty, Las Animas, Hadley Sta., La Junta, Timpa, Thatcher, Tyrone, Hoehne, Trinidad, Raton, Maxwell, French, Springer, Colmor, Las Vegas, San Jose, Pecos, Glorieta, Canoncito, Santa Fe, Domingo, Albuquerque, Kirkpatrick Spring, Becker, Socorro, Magdalena, Quemado, Springerville, Cooleys Ranch, White River Indian School, Rice, Globe, Roosevelt Dam, Fish Creek, Mesa, Tempe, Phoenix, Buckeye, Palo Verde, Arlington, Agua Caliente, Palomas, Antelope Hill, Dome, Yuma, Knob Siding, Holtville, El Centro, Campo, La Mesa, San Diego, North San Diego, Delmar, San Juan Capistrano, Irvine, Tustin, Santa Ana, Los Angeles, Cal.

Raton, N. M.—Siloam Springs, Ark.

Sugarite, N. M.—Editor *MOTOR AGE*—Give route from Raton, N. M., to Siloam Springs, Ark., and approximate mileage.—A. L. Brockman.

From Raton, N. M., proceed to Trinidad, Thatcher, La Junta, Las Animas, Lamar, Granada, Holly, Colo., Syracuse, Kendall, Lakin, Dodge City, Spearville, Dundee, Lyons, Sterling, Hutchinson, Halstead, Newton, Wichita, Winfield, Independence, Joplin, Mt. Vernon, Springfield, Marshfield, Hartsville, Mountain Grove, Willow Springs, to Siloam Springs.

Escanaba, Mich.—Duluth, Minn.

Escanaba, Mich.—Editor *MOTOR AGE*—Give route from Escanaba to Duluth. What is distance between these places and also between Chicago and Detroit.—Ned Moran.

From Escanaba, proceed to Spalding, Iron Mountain, Iron River, Marenisco, Ashland, Duluth.

The distance between Escanaba and Duluth is about 240 miles and from Chicago to Detroit 290 miles, depending, of course, upon the routes taken.

Vol. 5 of the Automobile Blue Book, published by the Automobile Blue Book Pub. Co., 910 South Michigan avenue, Chicago, contains complete running directions for this trip.

Elgin, Ill.—San Francisco, Cal.

Elgin, Ill.—Editor *MOTOR AGE*—Give best route from here to the Pacific coast.—Donald S. Hubbell.

From Elgin proceed to Rockford, Dixon, Sterling, Erie, Hillsdale, Moline, Davenport, Durant, Moscow, Iowa City, Coralville, Marengo, Victor, Grinnell, Kellogg, Newton, Altoona, Des Moines, Redfield, Monteth, Exira, Minden, Underwood, Omaha, Neb., Elkhorn, Fremont, Schuyler, Duncan, Central City, Grand Island, Shelton, Kearney, Odessa, Overton, Lexington, Cozad, Gothenburg, North Platte, Sutherland, Paxton, Ogallala, Brule, Big Springs, Chappell, Lodge Pole, Sunol, Sidney, Potter, Kimball, Bushnell, Pinebluff, Egbert, Cheyenne, Buford, Laramie, Bosler, Lookout, Medicine Bow, Fort Steele, Rawlins, Wamsutter, Red Desert, Tipton, Point of Rocks, Rock Springs, Green River, Bryan, Grainger, Evanston, Castle Rock, County Well, Fish Springs Ranch, Ibapah, Schelbourne Pass, Ely, Eureka, Austin, Fallon, Hazen, Wadsworth,

Derby, Reno, Truckee, Alta, Colfax, Roseville, Sacramento, Woodbridge, Stockton, Tracy, Livermore, Oakland and San Francisco. From San Francisco go down the coast via inland route through Fresno and Bakersfield to Los Angeles. This route is more preferable at this time on account of road construction now in process on the coast route.

Vols. 5, 7 and 8 of the Automobile Blue Book published by the Automobile Blue Book Pub. Co., 910 S. Michigan Ave., Chicago, contain complete running directions for this trip.

Mt. Vernon, Ia.—Golconda, Ill.

Mr. Vernon, Ia.—Editor *MOTOR AGE*—Give best route from here to Golconda, Ill.—D. L. Stears.

From Mt. Vernon, proceed to Marion, Cedar Rapids, Shenoyville, North Liberty, Iowa City, W. Liberty, Atalissa, Moscow, Wilton Jct., Durant, Davenport, Rock Island, Milan, Swedenia, New Windsor, Alpha, Henderson, Galesburg, Knoxville, Brimfield, Peoria, E. Peoria, Groveland, Dillon, Delavan, New Holland, Midletown, Springfield, Rochester, Roby, Taylorville, Vanderville, Nokomis, Vera, Vandalia, Bluff City, Augsburg, Salem, Dix, Mt. Vernon, Bonnie, Ina, Benton, Frankfort, Marion, Crab Orchard, Harrisburg, Eddyville, Waltersburg, Golconda.

Vol. 5 of the Automobile Blue Book, published by the Automobile Blue Book Pub. Co., 910 South Michigan avenue, Chicago, contains complete running directions for this trip.

Norfolk, Va.—Richmond, Va.

Driver, Va.—Editor *MOTOR AGE*—Give Norfolk to Richmond route.—W. R. Winner.

From Norfolk, proceed to Sewells Point, thence to Newport News, Denbigh, Leehall, Williamsburg, Lightfoot, Toano, Barhamsville, New Kent, Richmond.

Volume 6 of the Automobile Blue Book, published by the Automobile Blue Book Pub. Co., 910 S. Michigan Ave., Chicago, contains complete running directions for this trip.

Warren, Ark.—Hopkinsville, Ky.

Warren, Ark.—Editor *MOTOR AGE*—Give best route from here to Hopkinsville, Ky.—I. B. Mendenhall.

From Warren, proceed to Little Rock, Galway, Lonoke, Prairie Center, Hazen, Clarendon, Brinkley, Forrest City, Madison, Ferry over Mississippi, Memphis, Tenn., Raleigh, Bartlett, Ellendale, Arlington, Galway, Braden, Mason, Stanton, Brownsville, Harvey, Jackson, Rollins, Springcreek, Terry, Huntington, Camden, Tennessee River Ferry, Trotters Landing, Hustburg, Waverly, McEwen, Dickson, Charlotte, Bellburg, Pardue, Cumberland River Ferry, Ashland City, Bordeaux, Nashville, Springfield, Cedar Hill, Adams, Clarksville, Ringgold, Tenn., Hopkinsville, Ky.

Volumes 5 and 6 of the Automobile Blue Book, published by the Automobile Blue Book Pub. Co., 910 S. Michigan Ave., Chicago, contains complete running directions for this trip.

Huntington, W. Va.—New York

Huntington, W. Va.—Editor *MOTOR AGE*—Give best way to go from here to New York.—Dr. Earl B. Giddie.

From Huntington proceed to Charleston, Marmet, Montgomery, Gauley Bridge, Ansted Sta., Rainelle, Meadow Bluff, Lewisburg, Caldwell, White Sulphur Springs, Covington, Va., Ashwood Tollgate, Hot Springs, Warm Springs, Bath Alum Springs, Fairview, Deerfield, Churchville, Staunton, Mount Sidney, Burkettown, Mount Crawford, Harrisonburg, Lacey Springs, New Market, Mt. Jackson, Edinburg, Woodstock, Maurertown, Toms Brook, Strasburg, Middletown, Stephens City, Kernstown, Winchester, Va., Berryville, Gaylord, Va., Rippon, W. Va., Charlestown, Harpers Ferry, Knoxville, Md., Frederick, Ridgeville, Cooksville, W. Friendship, Ellicott City, Catonsville, Baltimore, Kingsville, BelAir, Churchville, Aberdeen, Havre de Grace, Per-

ryville, Principio Furnace, Charlestown, North East, Elkton, Newark, Del., Wilmington, Marcus Hook, Pa., Chester, Norwood, Darby, Philadelphia, Parry, Moorestown, Mt. Holly, Pemberton, Wrightstown, New Egypt, Cassville, Lakewood, Adeptia, Freehold, Marlboro, Matawan, South Amboy, Perth Amboy, Rahway, Elizabeth, Newark, Jersey City, Weehawken, New York.

Volume 3 of the Automobile Blue Book, published by the Automobile Blue Book Pub. Co., 910 S. Michigan Ave., Chicago, contains complete running directions for this trip.

Fairfield, Ia., to Thermopolis, Wyo.

Fairfield, Ia.—Editor *MOTOR AGE*—Give route from here to Thermopolis, Wyo.—Mrs. Wm. Schief.

From Fairfield proceed to Batavia, Agency, Ottumwa, Fremont, Oskaloosa, Pella, Prairie City, Des Moines, Adel, Redfield, Dale City, Monteth, Guthrie Center, Exira, Walnut, Avoca, Minden, Underwood, Weston, Omaha, Neb.; Elkhorn, Valley, Fremont, Ames, North Bend, Schuyler, Richland, Columbus, Duncan, Central City, Grand Island, Wood River, Shelton, Gibbon, Kearney, Odessa, Elm Creek, Lexington, Gothenburg, North Platte, Sutherland, Paxton, Ogallala, Brule, Big Springs, Chappell, Lodgepole, Sunol, Sidney, Potter, Dix, Kimball, Bushnell, Pinebluff, Wyo., Egberg, Burns, Cheyenne, Chugwater, Glendo, McKinley, Orin Junction, Douglas, Glenrock, Casper, Johnson Ranch, Powder River, Powder River Ford, Hells Half Acre, Waltham, Armito, Lost Cabin, Reids Ranch, Thermopolis.

Volume 5 of the Automobile Blue Book, published by the Automobile Blue Book Pub. Co., 910 S. Michigan Ave., Chicago, contains full running directions for this trip.

Detroit, Mich., to Omaha, Neb.

Greenwood, Neb.—Editor *MOTOR AGE*—Give route Detroit to Omaha and mileage.—N. H. Meeker.

From Detroit, Mich., proceed to Ypsilanti, Milan, Dundee, Temperance, West Toledo, O., Toledo, Wauseon, Archbold, Bryan, Edgerton, O., Butler, Ind., Kendallville, Wawaka, Ligonier, Benton, Goshen, Dunlap, Elkhart, Mishawaka, South Bend, New Carlisle, LaPorte, Westville, Valparaiso, Hobart, South Gary, Highland, Hammond, Ind., South Chicago, Ill., Chicago, Sterling, Galt, Lyndon, Erie, Hillsdale, Watertown, East Moline, Moline, Davenport, Ia., Durant, Wilton Junction, Moscow, Atalissa, West Liberty, Iowa City, Coralville, Oxford, South Amana, Marengo, Victor, Brooklyn, Grinnell, Kellogg, Newton, Colfax, Altoona, Des Moines, Van Meter, Stuart, Adair, Atlantic, Oakland, Council Bluffs, Omaha.

The trip one way would approximate 900 miles.

Complete running directions would be found in Vols. 4 and 5 of the Automobile Blue Book, published by the Automobile Blue Book Pub. Co., 910 S. Michigan Ave., Chicago.

Beloit, Kans.—Cedar Rapids, Ia.

Beloit, Kan.—Editor *MOTOR AGE*—Give best route from here to Cedar Rapids, Ia. Expect to be in Iowa a month or six weeks. Will I have to get a license in that state?—R. L. Metcalf.

From Beloit, Kans., proceed to Formoso, Lovewell, Webber, Superior, Neb., Nelson, Fairfield, Harvard, Hastings, Fairmont, Exeter, Friend, Lincoln, Havelock, Louisville, Omaha, Council Bluffs, Underwood, Minden, Avoca, Walnut, Elk Horn, Exira, Guthrie Center, Monteth, Dale City, Redfield, Adel, Des Moines, Colfax, Newton, Kellogg, Grinnell, Brooklyn, Victor, Ladora, Marengo, Middle Amana, Amana, Cedar Rapids.

Non-resident motorists are allowed thirty days in Iowa without purchase of license.

Volume 5 of the Automobile Blue Book, published by the Automobile Blue Book Pub. Co., 910 S. Michigan Ave., Chicago, contains complete running directions for this trip.

Practical Traffic Signals

Reader Outlines Opinion of What Devices Should Be to Be Most Advantageous

ANTIGO, Wis.—Editor MOTOR AGE— I have noted the discussion of what constitutes the practical traffic signal, which has been carried on through the columns of MOTOR AGE.

There no doubt is a crying need for a practical signal device, and the failure of the many that are now on the market is due to the fact that they are either confusing as to their object, the mechanism is impracticable, or the manner of control is not proper, and all are subject to the possibility of the operator giving the wrong signal in emergency cases. It is my belief that the device should be neither automatic nor under electrical control, in order positively to avoid giving a wrong signal, and in order that a signal may be given and set until the driver's intention has been carried out.

Electric Control

A device under electric control that provides the different signals that are required, that is, indicate a turn right, left, or stop, slow or ahead, would have to have at least three control buttons, and as there is always more or less vibration of the steering wheel, one is very liable to press the wrong button and thus convey to a driver behind him, or the pedestrian, a signal entirely different from his intention and action. If the indicator is not in a place where the driver can always see it he is unaware of his mistake, and thus should an accident occur, there is question as to who is liable for the probable damage.

One of your correspondents says a warning to a driver in the rear that the car ahead means to act in some way other than going straight ahead, is all that is necessary, as the driver behind will slow down—go out of gear or stop and wait to see what the car ahead means to do. Why should the car behind be forced to stop if there can be a signal positively to convey the intended action of the driver ahead? He also says a signal in front is not necessary, as a traffic officer has control of the driver, and would not notice any signal. If in a closed car and his vision through the windshield should be impaired by reason of rain or snow, how can one signal quickly to the officer that he desires to turn, or how can a pedestrian know that a driver will turn in their direction under these circumstances?

It seems to the writer that there is need for the device to show both in front and in rear, a right and left signal to turn and by pointer only, as letters are apt to be confused with those and the figures of the

license number plate. The word "stop" should not appear on a rear signal, especially if controlled automatically by the brake pedal, as very frequently drivers press their brake to slow and do not mean to stop, or for the driver behind to stop. However, the signal is shown to him and if he acts upon it, and finds there was no reason for his having done so, he has reason to disregard such signals in future.

The practical device is one that can be operated at will and set to remain several seconds in the position indicating the driver's intention. The proper place is on the front or rear fenders, as this position is conspicuous and not so likely to be confused with other fixtures about the car.

My idea of a practical signal is: First, an arrow is only meant to do one thing, and that is to point. A very small child knows this, and if the arrow is large and in plain view, its direction is grasped and meaning sensed in a fraction of a second. The arrow should be clearly visible day or night for a distance of 75 or 100 yd. and its meaning will be understood as it would occupy a position on the fenders where nothing else is placed, or seldom, at least, and it would not be obscured by anything. It should be neat and not so large as to look bulky and mar the appearance of the car. The driver could always see that it is working and know that the one in the rear is, also, for one would not work without the other acting in the same way. Its action would be instantly observed. When in neutral the arrow would point ahead.

A driver could operate a signal of this kind as easily as he could press a button to shift an electrically-controlled device. A fraction of a second only is required to push or pull a control lever and if one wished to illuminate the arrows he would close the switch in the handle as he grasped it.

An electrical device gets out of order because of lack of current in case of a short circuit in the wiring. Damp or cold weather makes them stick and fail to operate. The device controlled by the steering wheel is always jiggling back and forth because of the swaying of the car. The ones operated by the brake are not proper for reasons previously mentioned.—M. B. Mills.

OHIO ROAD LAWS ENDANGERED

Columbus, Ohio, April 20—Through the discovery of a blunder committed by an employe of the printing department, made by the attorney of the Ohio Good Roads Federation, it is believed in official quar-

ters that after June 28 next there will be no state highway department in Ohio and no laws for the construction and repair of inter-county and main market roads.

The intelligence has been conveyed to Governor James M. Cox, and it is probable that a test suit will be filed in the Supreme Court in an endeavor to save the law. If this fails, the situation may compel the calling of an extra session of the general assembly. In the opinion of many attorneys who have been consulted there is little hope of success in the courts because of the decisions of the last two years in matters of defective legislative bills.

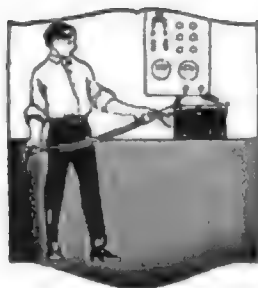
The blunder consisted in substituting the title of the bill for the absolutely necessary enacting clause. This had the effect of authorizing no new legislation while the repealing clause, which is flawless, does away with all the new highway laws enacted since the beginning of the good roads movement.

IOWA 1916 FATALITIES HIGH

Des Moines, Iowa, April 20—Reckless driving is given as the main reason for Iowa's gruesome record of 199 persons killed in highway accidents during 1916. Altogether, newspapers carried reports of 2834 motor car accidents, with more or less serious injury to 2,574 persons. The recklessness was manifested in too high speed for the condition of the road and the traffic on it. Ninety per cent of the accidents were due to motor cars, and most of the 90 per cent was due to recklessness, according to the highway commission.

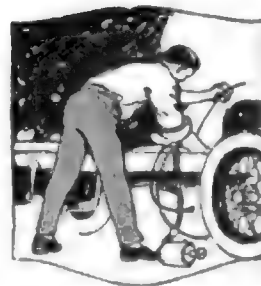
MARK HIGHWAY FEEDERS

Chicago, April 20—Objections raised by park commissioners, who control the Chicago boulevard system, against sign-board-ing the boulevards to indicate the best ways of getting into the city from the Lincoln highway have been overcome, and members of the Chicago Automobile Trade Association through popular subscription will mark the feeders to the Lincoln highway from Dyer, Ind., and Geneva, Ill. They believe the investment will be well worth while, since it is felt a great many tourists over the Lincoln highway pass by Chicago because the road proper runs somewhat to the south of Chicago, striking Joliet and then turning north to Geneva. By marking the route in and out of Chicago, the dealers believe they will get much more tourist business.



Electrical Equipment of the Motor Car

By David Penn Moreton & Darwin S. Hatch.



Editor's Note—Herewith is presented the fortieth installment of a weekly series of articles begun in MOTOR AGE issue of June 29 designed to give the motorist the knowledge necessary to enable him to care for and repair any and all of the electrical features of his car, no matter what make or model it may be. At the conclusion of this series, "Electrical Equipment of the Motor Car," with additions, will be published in book form by the Class Journal Co., Chicago, in a size to fit the pocket conveniently.

The fundamentals of electrical circuits of the motor car were explained through their analogy to water systems, and the relations of current pressure and resistance were brought out. This was followed by an explanation of series and multiple circuits, how electricity is made to do work in lighting, starting, signalling, etc. Calculating the capacity of a battery for starting and lighting and the cost of charging storage batteries and determining the torque a starting motor must develop were explained. Action of primary batteries and dry cells was considered. A section was devoted to the makeup and action of lead and Edison storage batteries, and another to the care of lead batteries in service and the best methods of charging them. Magnets and electromagnetism then were considered, and the principles of generators and motors explained.

Part XL—Combining Starting, Lighting and Ignition

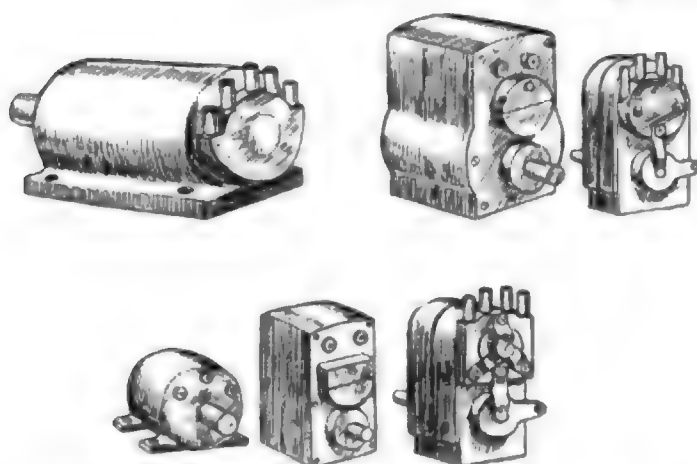


Fig. 234—Units of the three systems. Above, left—single-unit, motor-generator; above, right—two-unit, motor, generator with ignition separate; below—three-unit, a motor, a generator and ignition

THE complete electrical equipment of the modern motor car ordinarily includes the three functions, starting, lighting and ignition. To consider the equipment as a whole, all three functions must be taken into consideration, though in a great many installations the ignition function either is quite separate or nearly so from the other two functions.

Relation Between Functions

The equipment by which the starting, lighting and ignition functions are maintained is arranged in different ways, and it is on the arrangements that the first general classification of all systems is based, and the design of the different units depends on which of the arrangements is employed. The electrical equipment which performs the ignition, lighting and starting of the motor car consist of the following main pieces of apparatus:

First, for the ignition there must be a source of electrical energy, either a storage battery, dry battery, the familiar type of magneto generator or a generator which is not of the magneto type. In addition there must be means for transforming the low

voltage current into a high voltage or high tension current and other means for distributing the current to the proper spark plug at the proper time.

Second, for lighting there must be a source of energy, such as a storage battery, which may be used in operating the lamps and signalling apparatus, and a generator which is equipped with the proper regulating devices and cutout so as to keep the battery fully charged.

Third, for starting the engine there must be an electric motor connected mechanically to the gasoline engine and connected electrically to the storage battery through the proper switches so that the battery will produce an electric current in the windings of the motor, causing its armature to revolve with sufficient force to turn the engine crankshaft over at the desired speed for starting. The battery producing the current to the windings of the motor must, of course, be charged in order that the battery be ready to meet any reasonable demands of the starting motor.

It is evident that the equipment required in performing any one of the above three functions need not be entirely independent of the equipment required in either or both of the other two. For example, the same storage battery and charging generator which supply energy for lighting the car may be used in producing current in the winding of the starting motor and, in many instances, for the ignition. Also, it has been found that other combinations of the equipment required in performing the above three functions may be made for the sake of lightness and simplicity.

There are, however, three fundamental parts to each system, no matter how the equipment required for these various functions may be interrelated, the ignition device, the charging generator and the starting motor. The manner in which these fundamental parts are related affords a means of classifying all starting, lighting and ignition systems into three classes—three-unit systems, two-unit systems and single-unit systems.

Difference in Names

Many manufacturers of these systems disregard the ignition feature in the nomenclature of their apparatus so far as the types of systems are concerned. Thus, they consider only two systems, the single-unit and the two-unit. The former comprises the type in which generator and motor are combined and the latter the type in which the generator and motor are separate. The ignition









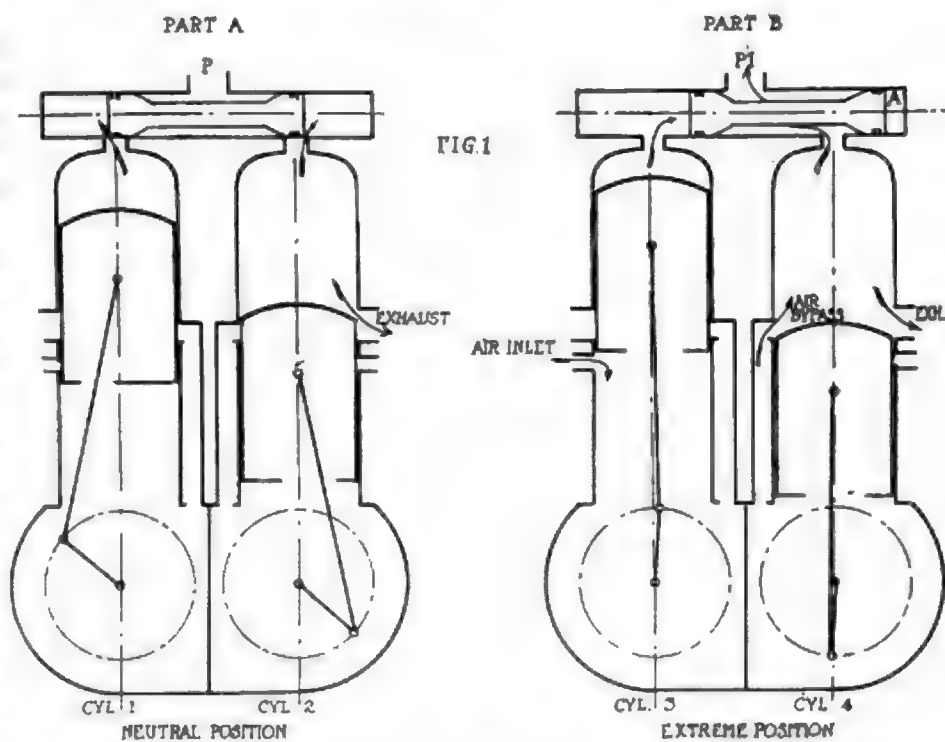


Two-Cycle Engine Which Idles

Williams Design Employs Pneumatic Valve for Handling Gases

SOMETHING radically new in motor car engines has recently been developed at Waukegan, Ill., the engine taking the name of a two-cycle, fuel-injection type. This engine, the Williams, follows conventional two-cycle design in that the piston covers and uncovers an exhaust port in the cylinder wall. Pure air is drawn into the crankcase and there compressed and forced into the combustion chamber; but it differs from ordinary practice in that the liquid gasoline is pumped into the combustion chamber where it mixes with the pure air coming under pressure from the crankcase. It could not be classified as a Diesel fuel-injection type, because in a Diesel engine the charge is exploded without a spark plug, the higher compression in the combustion chamber igniting the charge. The Williams engine does not use such high compression but fits conventional spark plugs.

As a result of this combination of two-cycle principles with fuel-injection principles the Williams engine will throttle to 100 r.p.m. Regular firing at low crankspeeds was one of the difficulties with two-cycle engines when used in motor cars, and because of its ability to idle at such low speeds the Williams engine is claimed to be suitable not only for motor car and motor



Diagrammatic sketches to show operation of Williams engine. Scavenging at slow speed is performed through a main exhaust at the bottom of the stroke and an auxiliary exhaust at the top of the stroke. The ingress of compressed air assists this

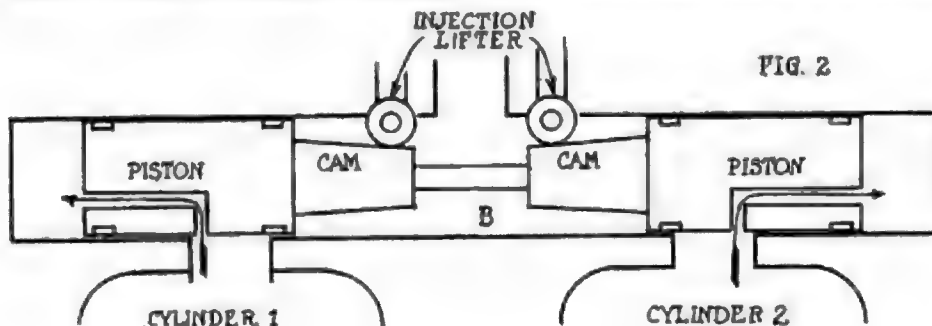


FIG. 2

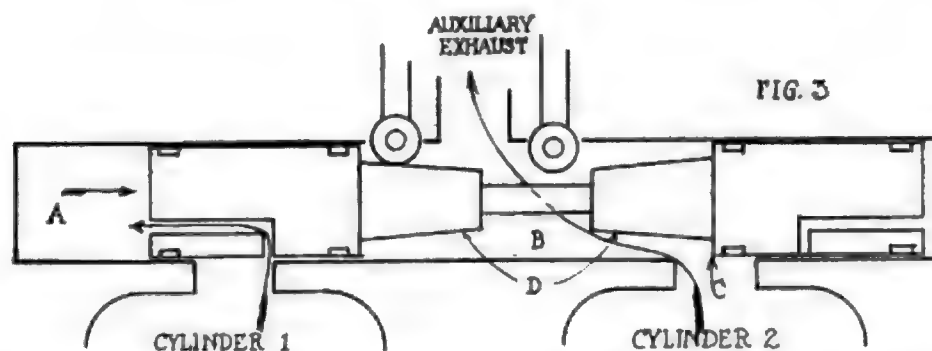


FIG. 3

Showing the pneumatic valve in neutral and in extreme position. This is actuated by compression from a pair of cylinders. The auxiliary exhaust is the throttle in that it regulates the length of the stroke of the pneumatic valve and thus the length of the stroke of the fuel injectors which are operated by the cams D.

truck work but also for aviation and marine.

Pumping of the liquid fuel into the combustion chambers is obtained without any gears or other mechanical means. It is done by a double piston valve which lies horizontally over the top of two cylinders, one valve unit doing for two cylinders. This valve slides back and forth due to the compression and exhausting in the cylinders. When one cylinder is compressing the valve is moved in one direction and when the other cylinder of the pair is compressing it is moved in the opposite direction.

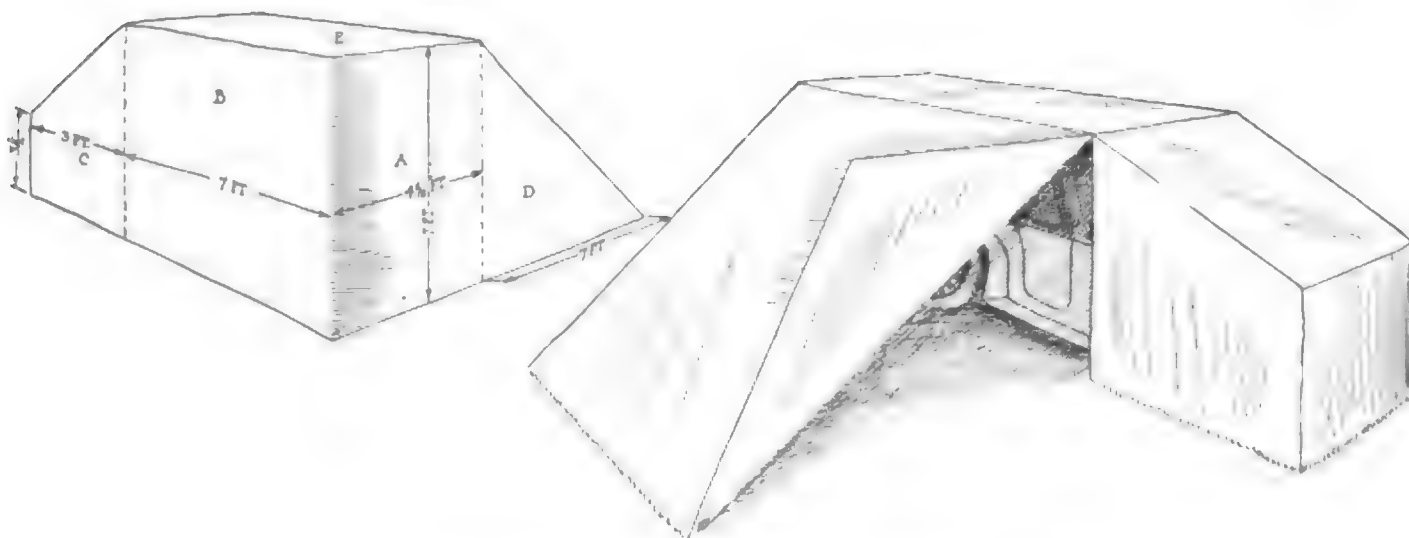
Before explaining in detail the exact scheme of valve operation, look at Fig. 1, which is a diagrammatic illustration of two cylinders in the Williams engine. The exhaust port is shown uncovered by the piston being at the bottom of the stroke in the cylinder at the right in each group. There is also an auxiliary exhaust through the valve in the cylinder head as indicated in Part B at P 1.

The left cylinder in Part B shows pure air entering a port at the left side of cylinder 3 while the piston is at the top and so entering the crankcase, where it is compressed and thence bypassed up the side of the cylinder to the combustion chamber as in cylinder 4.





The Motor Car Repair Shop



Figs. 1 and 2 showing tent dimensions and method of opening

Tent Costs \$10 for Material and Labor

THE little cross-country motor trips that so many of us enjoy yearly are appreciated much more if they include a night or two that can be spent in the open in true outing style.

When the skies are clear, nothing is necessary for the night's stop save enough bedding to keep off the chill. But to be on the safe side, a tent of some sort should be included.

Tents there are of all kinds, but one that will include the car and yet be small enough for all practical purposes has not as yet been made on any commercial basis. The ordinary square, gable-roofed tent is of such shape that, were it purchased large enough to accommodate the car also, it would require a tow-cart to carry it.

Another Variety Offered

There is also another variety that might be used for this purpose, that of the single-slope roof tent. But even this kind must be much larger than it might be were it of different shape.

The accompanying illustrations show a tent which is made especially to fit over the car. Made of light weight duck, it does not take up much room and yet when set up, not only includes all of the car, but provides for ample space at one side for beds and what tent room is commonly used for.

Where it is inconvenient for one to cut and assemble the sections himself, the work

may be done at a harness shop or by a seamstress for \$2 or less.

Material quite suitable for a tent of this kind is 8 oz. duck, which may be purchased in convenient 36-in. widths. This usually retails at 20 cents per yard, but may be bought a little cheaper from some houses. The covering herein considered would require approximately 32 yd., which would total \$6.50 for the canvas, but many cars could be accommodated in a smaller tent. At any rate, with the work all hired, the cost of the completed cover would come well within the \$10 mark.

Note that the dimensions are somewhat general and the pieces dimensioned, when assembled, would make a cover that would accommodate a large car, but the dimensions may be readily decreased.

Fig. 1 shows the front, right-hand side view of the tent cover in place. The flap thrown back on the tent fills the opening below when there is a need for it. It may be readily laced to the adjacent side, making a snug tight tent all around. The bottom of the tent is staked down also.

The following list gives the dimensions required as shown in Fig. 2:

	Ft.
A	31.5
B	49
C	15.75
D	24.5
E	31.5

H	15.75
I	56
K	20.25
D'	24.5
C'	15.75

Total, 284.5 ft. or 32 yd., approximately.
At 20 cents per yard, \$6.40.

Do Not Overload Engine

The seeming epidemic for rebuilding touring cars and roadsters into speedsters has led many MOTOR AGE readers to inquire how they can best alter the engines for increased speed. It is all right to put on a magneto, new carburetor, aluminum pistons, etc., but the power of an engine should not be increased by increasing the force of the explosion by most of the ordinary means unless the life of the engine is expected to be decreased.

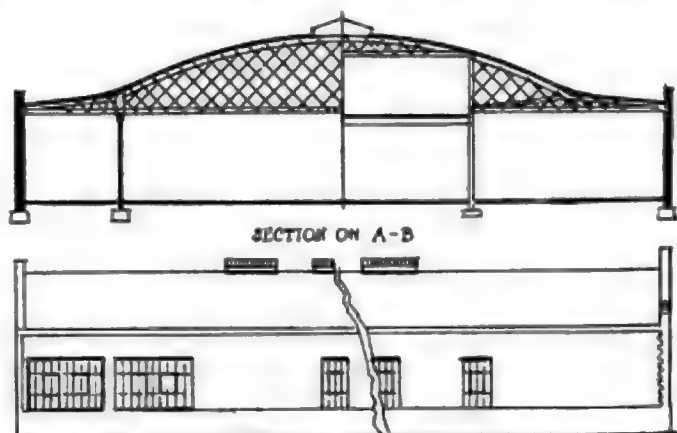
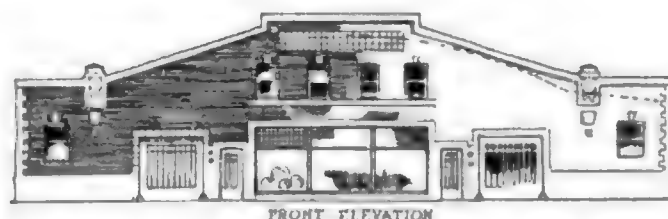
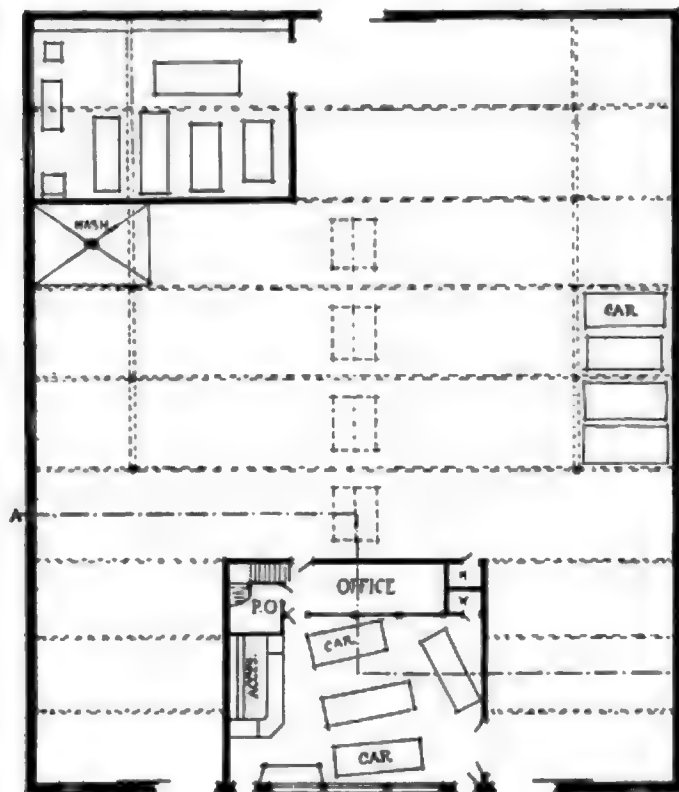
If the size of the combustion space is decreased, thus increasing the pressure, and hence the force of the explosion, the stress on the connecting rods, crankshaft, etc., is increased.

Many will wonder, after transforming the engine, why the bearings become loose in a short time and why the engine rattles generally. Although the design of an engine is such that extra loads may be carried by its internal parts, the longest service can be obtained only by operating the engine under the conditions called for by the construction.





The Readers' Clearing House



SCALE 0 5 10 20 30 40 50 FEET

Plans for Fifty-Car Garage 100 by 120 Ft.

CANON CITY, Colo.—Editor MOTOR AGE—We are going to build a garage. We want the most modern ideas of construction in a sketch and description. Following are the specifications: Cost, \$10,000 to \$15,000; height, one story; face on main street, 100 ft.; face on side street, 120 ft.; display room to hold four or five cars, office, stock room, wash rack, repair shop to hold five cars. What would be the most attractive front material, white preferred?—Royal Gorge Motor Co.

See above. This garage as planned will provide storage room for more than fifty cars, a repair shop capable of taking care of four or five and a show room that will accommodate four cars with one displayed in the window.

The office is at the rear of the show room with a small private office in the corner behind the accessory department. Above the office and show room section is a second floor or loft that will accommodate accessory stock and be a good light location for a vulcanizing room.

The row of posts at the sides and rear of the garage section is spaced so that two cars can be stored in each space and by using this space for storage exclusively the posts will not interfere with traffic in the least. The space between the rows of posts will, of course, have to be trussed and we have suggested the lattice truss as it is very generally used in garage construction and is less expensive than timber or steel,

though the latter would make a job much less liable to fire hazards. A less expensive construction would employ posts throughout, eliminating trusses but cutting down the value of storage space.

Four skylights are suggested to aid in lighting the center, and if windows cannot be provided in the right hand wall two or three more skylights along that side would be advisable, as workmen cannot do as well where they are handicapped by darkness.

The front of this building is shown treated in white terra cotta and dark red or brown brick. By carrying the terra cotta about four feet up from grade, a beautiful white expanse will be obtained that will admit of cleaning and keeping neat without great expense.

If the terra cotta proves too expensive, white or cream enamel brick might be substituted, or even a smooth cream colored face brick used with a few cream colored terra cotta ornaments to relieve it.

FORD OWNERS DO YOU KNOW THAT A Knock You Blame to Bearings May Be Dirty Plug?

Walnut, Ill.—Editor MOTOR AGE—Some time ago I wrote that my Ford gave a big vibration at times; at other times it

ran perfect. I stated that evidently the magneto was set too close and asked if that would affect the ignition and lights. You asked me what I found. ANSWER:

The magneto was not perfectly true and one magnet hit a little on three of the balls, I don't know what their name is. In setting it apart I set it back $\frac{1}{4}$ in. fearing it might hit again. There was no change in the lighting that I could detect, but that same vibration was still there. I decided to go thoroughly over the entire engine and at the same time lap in over-size pistons to stop one from oiling up and keep the engine quiet for a longer period. As I had just gone over the gearset and the main bearings were perfect, I took out the pistons without removing the cylinder block and there the vibration cause was apparent. One of the bearings on a wrist pin was so loose that it worked out against the cylinder wall and showed where considerable of the end had been worn off. At times evidently it would work into its proper place and cause no trouble.

Now I note that on page 40 of the March 1 issue you say the piston cannot be fitted without taking the block off. Why? I lapped in these .0025 pistons, of course, fully protecting the main bearings, and to date the job seems so perfect that I have



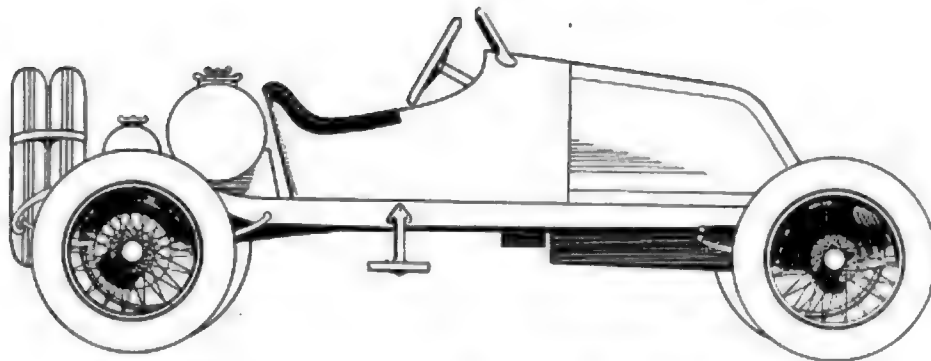


Fig. 3—Hybrid car combining Mercer chassis and Franklin engine with special body using Franklin-type hood

highest position. Should spark knock occur with the points in this position, it perhaps would be well to reduce this clearance to approximately .020 in. However, this range should be within the limits of .020 to .025 in.

2—Salisbury Wheel & Mfg. Co., Jamestown, N. Y.

D. C. MOTOR INTO A GENERATOR

Directions for Converting Electrical Machine Given

Texas City, Ill.—Editor MOTOR AGE—Referring to an article in the March 15 issue by David Penn Moreton, would like information in regard to a small direct current motor. This machine has been used in a signal system, using Edison primary batteries, as the power. The armature is about 3 by 3 in. The commutator has four brushes, or rather two pair of brushes on it, and it is about 1 in. in diameter; the brushes are of copper, laminated. The magnets are composed of laminated iron, so are non-magnetic when there is no current through the feed coils. They are divided at top and bottom by a wooden block and bound together with brass. The field coils measure about 2 by 3¼ by 4 and the wire is either No. 14 or 16. There are four leads from the machine, two from the field coils and two from the brushes. I would like to use the above machine for a generator. What changes would I have to make for this? What voltage and amperage would it likely develop? How many lamps would it likely light?—Cecil C. Camp.

The first thing you must do in unwinding your generator is to get magnetization, which may be done as explained in the March 15 article. The magnetic circuit should, of course, be worked near, or a little above the "knee" of the magnetization curve which fixes the field strength of the machine. Now the voltage generated in the armature winding for this particular field strength will depend upon the speed at which the armature is revolved, assuming the brushes are in their proper position on the commutator. The speed of the machine may be adjusted so that it gives the desired voltage provided this speed is not beyond the safe limit at which the armature should be revolved. There is also a limit to the voltage the machine may be made to develop, which depends upon the number of commutator segments. The voltage between segments should not exceed 10 volts and difficulties may be encountered in commutation for voltage between segments much less than 10.

If the material composing the magnetic circuit is such that it will not retain sufficient magnetism so that the

machine will build up as a self-excited generator, then a field current must be provided by means of a storage battery or other direct-current source of energy. The ampere turns required in the field winding will be equal to the product of the number of turns now in the field winding, and the current required to raise the magnetic field to a point a little above the knee of the magnetization curve. This field current may be excessive for the present number of turns and may be reduced by winding on more turns of smaller wire. The size wire and number of turns may be calculated as explained in the main article.

The current it is possible to take from the armature will depend upon the size of wire in the winding and which is more a matter of experiment than calculation.

TIMING OF OVERLAND MAGNETO

Flywheel Has Markings That Assist in Setting

Weldon, Iowa.—Editor MOTOR AGE—I have an Overland Model 69 T. 1913. How do you time the magneto on this model? It is a Remy model R. L.

2—When timing the magneto is No. 1 cylinder on dead center or past center on the firing stroke?

3—Should the platinum points commence to open just as the piston starts from upper dead center?

4—Has Schebler brought out its new model carburetor to handle the lower grade of gasoline yet?

5—In what order does an Overland Model 69 T. fire?—C. D. Jamison.

1—In order to time properly a Remy magneto in connection with a model 69 T Overland engine, first turn the engine until the pistons in No. 1 and No. 4 cylinders are in their uppermost position, namely top center, at which time examine the marking on the flywheel. The marks 1 and 4 on the

top part of the face of the flywheel will be found in direct line with the center of the rear cylinder. Move the flywheel approximately ¼ in. beyond this upper dead center; that is in the direction in which the engine rotates. With the spark lever fully retarded, set the magneto on the engine base so that the breaker just begins to separate the platinum points. The distributor segment must make contact with the segments attached to No. 1 cylinder wire.

2—Explained in answer 1.

3—Explained in answer 1.

4—It is not yet ready for the market.

5—The engine fires 1, 3, 4, 2. In order to determine when No. 1 cylinder is in its firing position examine the push rods carefully. When turning the engine over to obtain top center of the pistons, examine the push rods in No. 1 cylinder. If both of them are free you can rest assured that that cylinder is in its firing position. However, should one of the push rods be tight, or the valve opened, turn the crankshaft one complete revolution.

Wants a Metz Speedster

Florydada, Texas.—Editor MOTOR AGE—I have a 1913 model Metz which I want to make into a speedster. Will you publish a rough sketch for it?

2—What speed could be gotten with this car?

3—Could a sliding gearset be put in this car and still use the chain drive? If so, tell me what kind and where manufactured.—E. Sims.

1—A sketch is published in Fig. 4. The design of this car requires that the seat be somewhat above the frame to allow clearance for the friction disk.

2—The speed possibilities would depend entirely on the condition of the car. There is no chance of giving a fair estimate when a car has been driven four years or more.

3—There is no sliding gear transmission especially adapted for this car. A special gearset with all necessary alterations would probably cost you \$100 applied.

Mercer With Franklin Engine

Victoria, ex.—Editor MOTOR AGE—Show outline drawing of your conception of a classy air-cooled raceabout with the usual tanks and tire holders in rear on a Mercer 35H, 1914 chassis, with 6-cylinder Franklin engine, Westinghouse shock absorbers front and rear, and wire wheels, 34 by 4¼.—C. D. Truitt.

The drawing you ask for is given in Fig. 3. The Franklin type of hood is used. If you are contemplating construction of such a car you must be prepared to lay

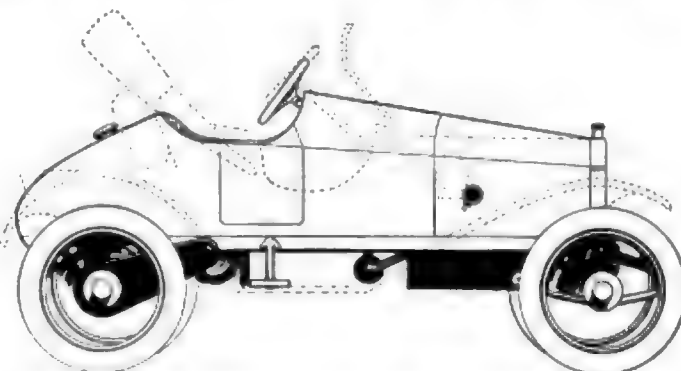


Fig. 4—Speedster body which could be applied to a 1913 Metz friction-drive car

out a considerable amount of money, possibly more than you realize. The Franklin engine is not at all adapted for the Mercer chassis and would require a complete new mounting, with the necessary alterations in the transmission units behind the engine.

RECONSTRUCTED CHALMERS SIX-40 Cannot Buy Ready-Made Speedster Body for Car

Columbus, Nebr.—Editor Motor Age—I have a Chalmers 1916 6-40 roadster. Give drawing showing what my car would look like made into a speedster.

2—Where can I buy a body for the above speedster complete, ready to bolt onto the chassis?

3—Where can I obtain aluminum pistons, rods and non-leaking rings for the Chalmers 6-40?

4—What is the size gear in this car, and how much higher can I gear it and still pull up ordinary hills?

5—What would be the approximate speed if the above changes are made?—W. A. Thomas.

1—The illustration is published in Fig. 5.

2—You would have to order a special body. There is no manufacturer making a speedster body specially for this model. A clever mechanic or sheet metal worker in your city should be able to build up a body for you.

3—Aluminum piston makers can furnish any size complete with rings. See the advertising pages of this issue.

4—We think you mean the gear ratio. This is 4 to 1. With a much lighter body you could use a gear ratio as low as $3\frac{1}{2}$ to 1.

5—This can be determined only by experimentation.

WANTS TO REBUILD JACKSON 32 To Use Disk Wheels and Body Like de Palma's Mercedes

Flint, Mich.—Editor Motor Age—I want to rebuild a Jackson model 32 5 passenger car into a racing speedster as cheaply as possible as I have not the necessary funds to put a lot on it. I am not after speed so much as looks. I have had road test, assembly, sheet metal work and general construction experience.

I want to put 20-gage sheet-metal disks on the wheels, a body similar to De Palma's Mercedes or as near that as possible, new carburetor if necessary, fenders, but no running boards and electric head and tail lights.

1—About what speed will this model make? Would a new carburetor help increase the speed?

2—How could I use the fenders now on car without running board so that they would look well?

3—Would you advise taping or winding cord around the springs? What is the proper way to do this?—Constant Reader.

1—The speed depends on such a great number of factors that no fair estimate

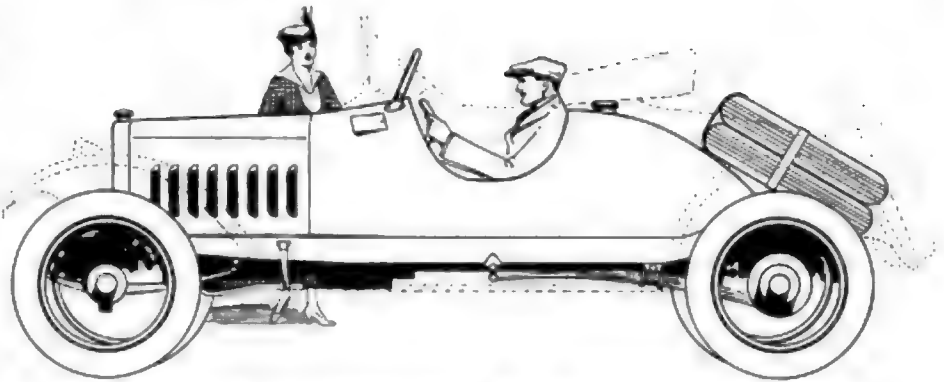


Fig. 5—Drawing showing how Chalmers 1916 model 6-40 could be rebuilt into a speedster

can be made. A modern carburetor would very probably increase the speed.

2—As shown in the sketch, Fig. 6.

3—If the car is too springy in fast driving it would be advisable to tape the springs. The taping is performed by winding the springs with tire tape, lapping one winding over the other and progressing from one end of the spring to the other. The amount you will stiffen the springs depends on the number of layers of tape you apply.

HOW A STEAM CAR IS REVERSED Tests Have Shown Mileage of 10 to 15 Miles Per Gallon

LaGrange, Ind.—Editor Motor Age—What is the price of a Doble steamer?

2—How is a the Doble steamer reversed?

3—Does a steam-car motor make as much noise as an ordinary gas car engine?

4—Has there been any test as to how far a Doble will run on a gallon of kerosene? If so, what mileage was obtained?

5—Is a 75-mile speedometer used as standard equipment on the Doble?—H. A. Gerberding.

1—The touring car or three-passenger roadster will sell for \$2,500. The prices of other models will be announced about the first of June.

2—In the same manner a locomotive is reversed. The positions of the valves are changed so that the steam forces the piston and thus the crankshaft in the opposite direction.

3—A steam car is as quiet as an ordinary gas car; much quieter than a good many of them.

4—Tests have shown that the car will run from 10 to 15 miles on a gallon of kerosene, depending upon the roads and average driving speeds. Under fairly good

conditions 13 to 14 miles per gallon is said to be the average consumption.

5—Yes.

WHAT IS MEANT BY GEAR RATIO Explanation of "Direct on High"—Ratio Versus Tire Size

Ogallala, Neb.—Editor Motor Age—Which car has the higher gear, a six or a four, both geared 4 to 1 on high; size of wheels the same?

2—Does any transmission have a "high" gear when the drive is specified "direct on high"?

3—How is gearing rated, by explosion or by revolution of crankshaft?

4—Which car is geared the highest, a four with 32 by $3\frac{1}{2}$ wheels or a six with 34 by 4 wheels, both having a 4 to 1 gear on high; 1 mean which car would travel the most feet per mile?

5—I wish you would give the names of any manufacturers making eight-valve cylinder heads for Fords.—A Subscriber.

1—If both are geared 4 to 1 then they have the same gearing. The number of cylinders in the engine makes no difference. The gearing means the reduction in the gearbox and reduction in the rear axle. Reduction means the changing of the relative speed of the engine and rear axle, this being performed first through gears in the gearbox and second through bevel gears which conduct the drive from the propeller shaft to the rear axle.

2—All cars with sliding gear transmissions have a high gear. Direct on high means that when the high-gear setting is made with the gear-shift lever that the drive through the gearset is performed without the aid of gears—direct. In other words the shaft coming from the clutch is locked directly to the propeller shaft which leads to the rear axle by a dog or dental clutch within the gearbox so that the power from the engine is transmitted directly to the bevel gears of the rear axle without passing through gears in the gearbox.

3—As previously explained gearing has nothing to do with the engine. Gearing in a motor car serves the same purpose as it does in your watch. It is there to change the relative speed of a driving and a driven rotating object. In low speed the engine in a motor car is turning at a higher rate of speed than in high gear and inasmuch as the power of a gasoline engine increases as the speed increases up to a certain high rate of speed then the car has more pull-

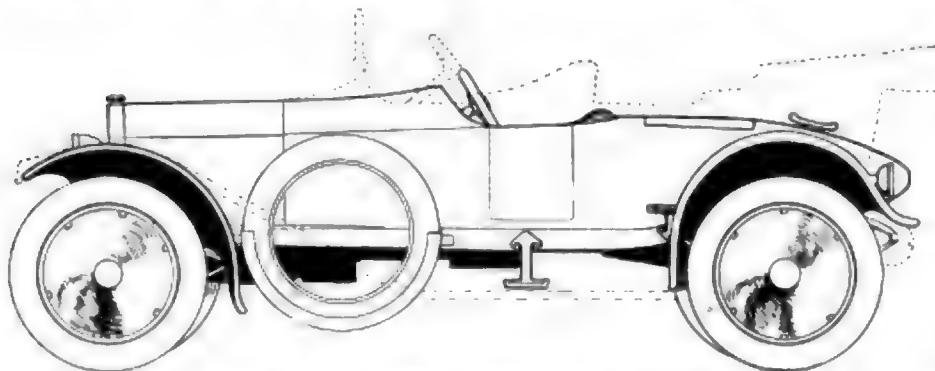


Fig. 6—Rebuilt Jackson model 32 with disk wheels and Mercedes-type body

ing power when the low speed gearing is engaged.

4—With the same number of revolutions of the engine the car with the smaller tires will travel the shortest distance. Naturally both cars will travel the same number of feet per mile inasmuch as there is a fixed number of feet in a mile.

It appears that you are not familiar with the functioning of a motor car from its engine to the tires and we are glad to explain it to you as follows. The gasoline engine rotates a clutch member which, when locked into another clutch member, causes a shaft to revolve within the gearbox. In the ordinary three-speed gearset, when high gear is engaged this shaft is locked into another shaft, the propeller shaft which then rotates in unit with the crankshaft of the gasoline engine. If intermediate or low speed is used, the shaft from the clutch and entering the gearbox causes a gear to rotate and this gear engages another gear which is on another shaft, known as the countershaft within the transmission case. Off of this countershaft is another gear which engages with still another gear on the propeller shaft. Thus the shaft from the clutch causes a gear train to rotate and these gears are of such size as to change the relative speed of the engine and propeller shaft, making the engine go much faster than the propeller shaft. In direct-drive high gear the engine turns over the same speed as the propeller shaft.

Now on the end of this propeller shaft within the differential housing on the rear axle is a bevel gear which engages another bevel gear which drives the rear axles. The bevel gear on the propeller shaft has a less number of teeth than that on the rear axle. Thus the small gear travels faster than the large gear and here we have the rear-axle reduction. If the gear reduction is said to be 4 to 1, these figures apply to the reduction in these bevel gears and it means that the propeller shaft gears turns over four times while the axle gear turns over once.

As regards tire sizes. Consider two tires of different size. The large tire will cause the car to advance a greater distance in

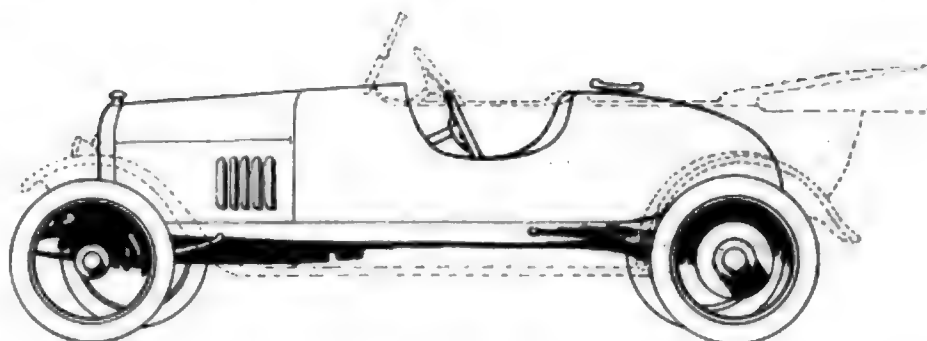


Fig. 7—Enger 1916 model with speedster body using so-called bee-hive back

one revolution than the small tire. This is because the distance around the large tire is greater. Although two cars may be both geared 4 to 1, if one has smaller tires than the other it will have greater pulling power than the other, considering that the engines deliver the same amount of power, due to the fact that the car will travel a shorter distance with the same number of revolutions of the engine.

5—The cylinder head of the Ford itself is eight valve. There are two valves per cylinder. If you refer to a sixteen-valve

head, these are being manufactured by Robert M. Roof, Anderson, Ind., and T. R. Noonan, Paris, Ill.

CHALMERS SIX-30 GEAR RATIOS Same Oil Used in Gearset as in Engine— Gear Ratios Given

Canton, O.—Editor MOTOR AGE—In what issue of MOTOR AGE appeared a description of the seven-passenger Chalmers 6-30?

2—What is the ratio of the gearbox gears on this car?

3—What is the gear ratio of the five-passenger Chalmers 6-30?

4—What kind of grease should be used in the gearset of these cars? The instruction book says gas engine oil. Does that mean the same oil that is used in the engine?

5—What size of fuses are used on the seven-passenger car and what is the amperage?—A Reader.

1—Jan. 4, 1917.

2—The gear ratios in both six 30 models are:

High speed 1 to 1

Second speed 1.93 to 1

First speed 3.38 to 1

Reverse 4.5 to 1

3—The rear axle ratios are as follows:

Six-30, five-passenger 4.75 to 1

Six-30, seven-passenger 5.18 to 1

4—The same oil as is used in the engine should be used in the gearbox.

5—The fuses used on the model six-30 are as follows: Five fuses, type 3, 15 amp., 6 volts. Two fuses, type 5G, 30 amp., 6 volts.

The type 3 fuse is of $\frac{1}{4}$ -in. diameter and $1\frac{1}{2}$ in. long and the type 5G fuse, $\frac{3}{8}$ in. diameter and $1\frac{1}{2}$ in. long.

Enger Made a Racer

Buffalo, N. Y.—Editor MOTOR AGE—Show diagram how 1916 Enger twin-six could be made a racer with so-called beehive in back.—J. I. Rains.

The diagram you ask for is shown in Fig. 7.

LIGHT PARTS OR SIXTEEN VALVES Least Expensive to Refine Present Ford Engine

Anthony, Kan.—Editor MOTOR AGE—I have lightened my Ford engine for speed purposes and before assembling, would like the following information:

I have lightened the connecting rods and used .031 oversize aluminum pistons. They weight respectively 3 lbs. 4 ounces each, which is exactly the same on druggist scales. I enlarged the valve $\frac{1}{8}$ in. and reamed out valve parts $\frac{1}{8}$ inch and used Dodge valves which I lightened down all they would stand, polishing them until they are perfectly smooth. I cut the stems down to regular Ford size. I placed a partition between the flywheel and crank pan which holds the oil deep enough for the rods to dip into and removed magnets from flywheel, installing six brass plates to throw the oil up

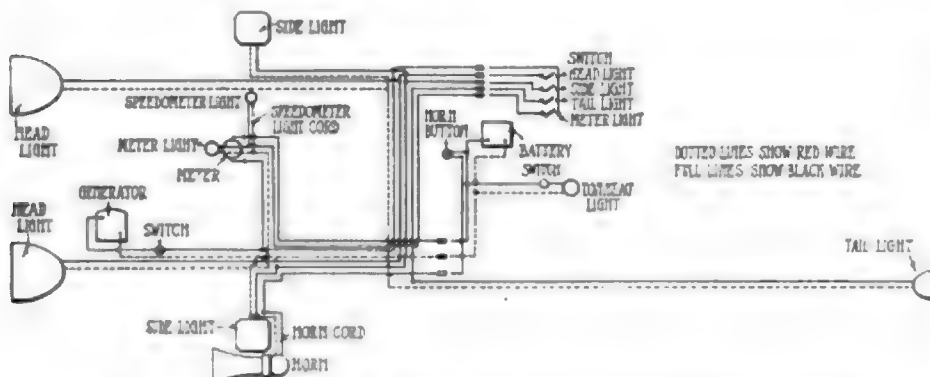


Fig. 8—Complete wiring of 1912 Stearns-Knight showing how voltmeter should be connected with lights, generator and battery. This was promised to A Reader, East St. Louis, Ill., in the April 19 issue of MOTOR AGE

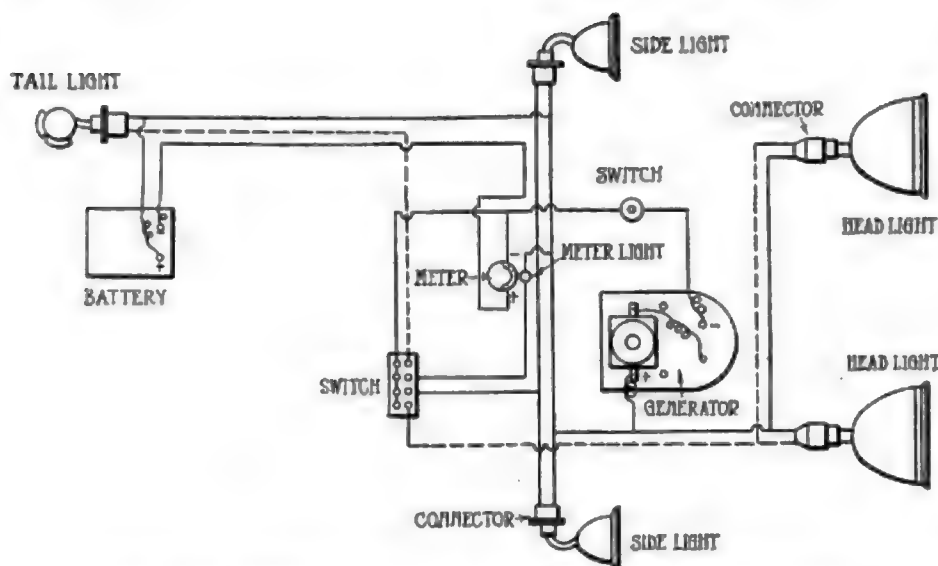


Fig. 9—Wiring diagram of 1912 Velle model M equipped with Vesta generator

into pan. I am installing Bosch magneto and 1 1/4-inch Rayfield carbureter.

I have the lowered frame until the driveshaft is directly on a line with the crankshaft and installed 28 by 3 wheels with 2 4/7 to 1 gear.

With the proper balancing of all parts, do you think it would be possible to obtain 60 m.p.h.?

Would it be better to install a sixteen-valve attachment? Would it justify itself in increased acceleration over the above changes, providing I have balanced everything correctly?—James J. Costa.

This car should be capable of 60 m.p.h. if not more. The sixteen valve attachment should increase the power of your engine by about 10 per cent and certainly the increased ability to accelerate rapidly and the greater engine speed and consequent car speed would be as well devised from this alteration as from the balancing. Better to combine them if it is within your purse.

WIRING DIAGRAM OF 1912 VELLE Could Not Change Springs Without Prohibitive Expense

Milwaukee, Wis.—Editor *MOTOR AGE*—Publish wiring diagram of the 1912 Velle, Model M, equipped with a Vesta generator.

2—What is the horsepower of this model?
3—Would it be possible to change the rear springs and use an extra bracket riveted on the frame similar to the F. R. P. and Maxwell cars?
4—What is the ratio of this car on high?
5—Could more speed be obtained if the tires are changed from 36 by 4 to 34 or 33 by 4 1/2 for the rear and 32 or 33 by 4 for the front?—A Reader.

1—The wiring diagram is shown in Fig. 9.

2—The maximum horsepower of this model according to brake test is claimed to be 45. The N.A.C.C. rating is 32.4.

3—Not without installing a new frame and in this old model the cost of such an alteration would be prohibitive.

4—The gear ratio on high is 3 13/14 to 1.

5—The speed would not be increased and would probably be reduced due to the fact that the engine would have to turn over more times for a given distance of car travel.

Wiring of Regal

Bourla, N. D.—Editor *MOTOR AGE*—Publish a wiring diagram of the 1916 four-cylinder Model D Regal.—Carl Kroger.

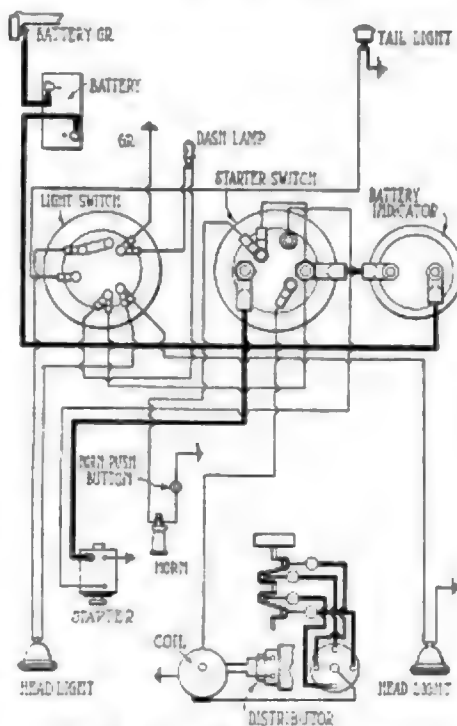


Fig. 10—Wiring of Dyneto and Connecticut systems as combined on 1916 Regal

1—The complete wiring of the Dyneto starting and lighting system and the Connecticut ignition system used on this car is shown in Fig. 10.

F. R. P. Construction Details

Springfield, Mo.—Editor *MOTOR AGE*—Answer the following questions concerning the F.R.P. car which is now being manufactured at Port Jefferson, L. I.:

1—Is this a sixteen-valve engine?
2—Are the valves located in the cylinder heads?
3—What is the clear diameter of the valves?
4—Are the valves actuated by push rods or overhead camshaft?
5—What is the diameter of the crankshaft?
6—What road speed should the model 45 equipped, with a four passenger body, show?—Hal. S. Miller.

1—Yes.

2—Yes.

3—The clear diameter is 1 1/8 in.

4—The valves are actuated by an overhead camshaft and rocker arms.

5—The diameter of the crankshaft is 2 1/2 in.

6—There is no official record of the speed of this car.

Studebaker 25 Data

Toledo, Ohio.—Editor *MOTOR AGE*—What make of engine was used in the Studebaker 25, 1913 model, or did the Studebaker people make this engine themselves?

2—What type of Splitdorf magneto is used on this car?

3—What make and model of carburetor was used on this car?—Reader.

1—It is equipped with a 25 hp. engine manufactured by Studebaker.

2—Splitdorf model No. C.

3—Manufactured by Holly Bros., Detroit, and known as the Holly.

Ammeter on Grant

Manzanola, Colo.—Editor *MOTOR AGE*—Give wiring diagram of a Grant Six Model T, 1915 for putting on an ammeter. This car has no polarity switch. I tried to wire one in as you have diagrammed on page 46 in the Feb. 8th issue and it did not seem to work. What is the matter?—John L. Clowes.

The diagram published in Fig. 11 shows the only method of connecting an ammeter to this model. If you find that this does not work in your car describe wherein the wiring in your car is different than the diagram shows and we will tell you what the trouble is.

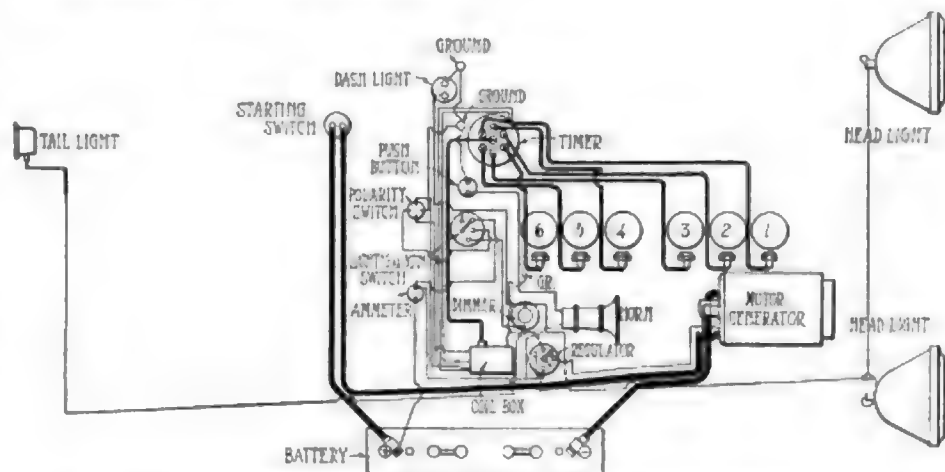


Fig. 11—Wiring diagram of Grant six Model T, 1915, showing method of connecting ammeter









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ANNOUNCEMENT

The feature of Motor Age for next week will be an article on staging the used car show. Chicago's dealers are preparing to exhibit at a "great central market used car show." This opens Saturday and will be in full swing by the next issue.

"NORMA" BALL BEARINGS

(PATENTED)



Dependability— isn't that the thing that you want, above all else, in your car? Go to the root of the matter, and you'll find that car dependability is a question of securing dependable ignition. Of importance hardly secondary is the necessity for dependability in lighting generator and starting motor. You are seeking facts. Note this:

So general is the use of "NORMA" Bearings in the high-grade magnetos and lighting generators furnished on cars of the better class, that the fact that its accessories are "NORMA" equipped is a proof of dependable quality in a car.

**Be Sure—see that your
Electrical Accessories
Are "NORMA" Equipped**



THE NORMA COMPANY OF AMERICA

1750 BROADWAY

NEW YORK

Ball, Roller, Thrust and Combination Bearings













Motor Corps Is Planned

Need of at Least 40,000 Skilled Drivers Confronts Army of 1,000,000

Receipt of Applications Indicates Draft Is Unnecessary Here

WASHINGTON, May 1.—Plans for motor and motorcycle corps for the new army of 1,000,000 men practically have been completed by army officers, members of the S. A. E. and others working under the direction of Howard E. Coffin, chairman of the advisory committee of the Council of National Defense, and the Motor Transport Committee, headed by Coker F. Clarkson. The War Department is to ask for bids, as already reported in *MOTOR AGE*, for 40,000 motor trucks. This means that at least that number of skilled drivers, and a very considerable number of mechanics, instructors and helpers, will be needed.

These will not have to be drafted, judging by applications which are pouring into the offices of the National Defense Council from all sections of the country. At the offices of Mr. Coffin it is stated no difficulty is anticipated in getting all the motor experts necessary. While these chauffeurs, mechanics, helpers and instructors will be accepted because of their fitness and training, once their services are accepted they will become enlisted men of the army, this step being necessary in order that the Government may avail themselves of their help.

PURCHASING AGENTS ORGANIZE

Detroit, April 27.—The Detroit section of the National Association of Purchasing Agents was organized last night and C. A. Woodruff, purchasing agent for the Chalmers Motor Co., was appointed chairman of the temporary governing committee. The other men on the temporary governing board are: J. H. Main, Cadillac Motor Car Co.; T. H. Maisonneville, Timken-Detroit Axle Co.; H. H. Viot, Continental Motors Corps.; George Berridge, Park-Davis Co.; T. P. Thornton, Detroit Steel Products Co.; H. Hawk, Willys-Overland Co.

TRACTOR TO SOLVE FOOD SUPPLY

Minneapolis, Minn., May 1.—Special telegram—The importance of this city and section in the solution of the future world's food supply problem was emphasized by H. L. Horning, addressing seventy-five members of Minneapolis Section, Society of Automotive Engineers, because here is concentrated the center of food supply of the United States and tractor industry. He said the tractor is the solution of food problem. Difficulty now is to get materials and labor for the industry. To increase the supply of tractors is the call to-day and to any good tractors we may land abroad to

help produce food there is solving our food problem here.

As chairman of the S.A.E. committees on tractors and fuel Mr. Horning reported conference with national council of defense and its agreement as to importance of tractor in food problem as capable of greatly increasing the crop. He reported progress in standardizing fuels and probable low cost as result of new processes of cracking.

That the four-cycle, four-stroke vertical type with early application of kerosene is the ultimate type of tractor engine was the gist of the morning papers. It should be capable of delivering 16 to 40 hp. continuously without distress at full load or over at from 750 to 1230 revolutions.

Questions by members brought out the importance of understanding combustion chamber in developing the engine and determining correct compression; that the lightest compatible lubricating oil should be used, and that constant level splash is best lubricating system, force feed having possibilities also.

NEW INTERESTS IN REGAL

Detroit, April 30.—The Lambert interests in the Regal Motor Car Co. have, in great part, changed hands. John Lambert and Charles Lambert have sold their interests in the company, though Bert Lambert retains an interest and will remain a director of the company. The Lambert interest has been purchased by St. Paul, Minn., capitalists who are represented by Frank H. Shaw, now treasurer of the Regal company. Mr. Shaw was formerly in the banking business in St. Paul. F. W. Haines remains as president of the company. H. H. Emmons has resigned as secretary and joined the United States Navy. He is succeeded by M. T. Boden who was formerly the treasurer of the company. Other officials remain as heretofore.

The Regal company is now producing ten to twelve cars daily and with the new working capital expects to attain a capacity of twenty cars per day in the near future.

LATE PRICE CHANGES

Toledo, Ohio, May 1.—Special telegram—The Overland big four has been advanced to \$895; the four roadster to \$880; the light six to \$1,025; the six roadster to \$1,010, effective to-day.

Detroit, May 1.—Special telegram—The Saxon six touring and six chummy roadster are now \$935. Other prices remain the same.

Detroit, May 30.—The American six five-passenger touring car has been advanced from \$1,285 to \$1,375.

New York, May 1.—Prices for the Kent car have advanced from \$985 to \$1,085, effective April 15.

New York, May 1.—Delmon and Hardman tires have been advanced in price about 15 per cent.

Needs Armored Cars

Munitions Bureau to Buy Tanks and Caterpillars Such as Europe Uses

British and French Experience to Help Army Prepare Motors

WASHINGTON, May 1.—The United States army needs, and it is now preparing to buy, through the munitions bureau of the Council of National Defense, large numbers of armored cars, tanks, caterpillars, etc., such as are being used with good effect in Europe. Specially built trucks, probably the four-wheel-drive machines, for use in the transportation of heavy army pieces in the field, have been planned and their construction decided upon. The problem which will face the army heads within the next six or eight months, when close to 1,000,000 men will be encamped and put through a rigorous course of training in the handling of field artillery pieces and other cumbersome army equipment, has not been overlooked.

The experiences of Great Britain and France with heavy motor apparatus are being drawn upon in plans for the best possible utilization of these factors by the War Department. These plans, on which experts of the army, officers assigned for duty in connection with the Council of National Defense heads are engaged, include the adaptation of motor trucks, tanks, armored cars of different designs, etc., to the varied uses and conditions which will confront the army once it is in the field.

STEWART-WARNER EARNINGS

Chicago, May 1.—Profits for the first quarter of 1917 as shown by the statement issued by the Stewart-Warner Speedometer Corp. were \$542,000 as against \$571,000 for the first quarter of 1916. This year it has been necessary to set up a heavy reserve to cover the increase in Federal income tax, and in general. The management has aimed to be conservative. Business in March was excellent, this having been the largest month in the history of the corporation. The enlarged Chicago plant and the new Beloit, Wis., factory will give the corporation greater facilities for handling this year's and future business.

FILL USED CAR SHOW SPACE

Chicago, April 30.—A motley and numerous representation of used cars of virtually every make sold in Chicago will be displayed at the "great central market used car show," which appears at the Coliseum May 5-13. Only one of the thirty-eight spaces for used cars remained unallotted last night. While distributors of thirty-four makes of pleasure cars and

three trucks appear on the list, it is probable this number will be greatly augmented, as the dealers are permitted to display cars which bear the names of factories other than those they represent.

The following passenger cars will be represented: Allen, Baker electric, Buick, Chalmers, Chandler, Cole, Detroit electric, Dodge, Empire, Ford, Franklin, Grant, Hal, Haynes, Hudson, Hupmobile, Jordan, King, Kissel, Marmon, Maxwell, Mitchell, Moline-Knight, Oakland, Overland, Owen Magnetic, Packard, Paige, Peerless, Pierce-Arrow, Reo, Studebaker, Vellie and Winton.

Commercial vehicles will be displayed by the Dearborn, Marf and Smith Form-a-Truck companies, and several accessory exhibits also will be there. Arrangements have been made for handling even larger crowds than those which attended the national exhibit of new cars in January.

IGNITION SYSTEMS; THEIR USE

Philadelphia, April 26—Of a total of 108 manufacturers of motor cars, eighty-six are to-day using battery ignition systems and twenty-two are using magnetos, many of the latter using dual systems which are virtually semi-battery ignition systems.

In making this statement before the Philadelphia Section of the Society of Automotive Engineers, H. E. Rice, sales manager of the Atwater Kent Mfg. Co., also laid stress on the need for standardization in certain parts of such equipment, which he stated is the least complicated and the easiest to maintain of all ignition systems. Rice's paper was entitled "Problems in Ignition Development."

In reviewing the development of ignition apparatus, Rice pointed out that ignition equipment represents only about 1 per cent of the total cost of the complete car but is 100 per cent important to the operation of the car.

"Battery ignition," he said, "may be divided into two general types and classified as open-circuit and closed-circuit systems. In each system the elements are almost identical, consisting of a combination low-tension circuit breaking and timing device, a transformer coil with primary and secondary windings and a distributing device for connecting each spark plug in its proper order to the high tension winding of the coil.

"The open-circuit contact-maker is so designed as to close the circuit of the transformer coil momentarily for each spark, the time interval being uniform at all engine speeds. The time during which the primary current flows through the coil is approximately 0.033 of a second for each spark. The current flow for this brief instant is about 4½ amp., but the time is so short that the energy consumed is almost negligible—a six-cylinder system requires less than 0.6 amp. at highest engine speed, and dry cells are economically used for current.

"In the closed circuit system the same elements are used except that the contact-maker is operated by direct cam action and the electrical windings are proportioned differently. The form of the contact-maker has been evolved from the magneto and consists of a simple arm carrying a contact point and controlled by a spring to bring the contacts together. The contacts are separated by the action of the cam on the timer shaft.

"By reason of this simple cam action the circuit is closed for a longer time interval than with the open-circuit system, and the contact varies with the speed—a long contact at low speed becoming shorter as the speed increases.

"This is a much simpler type of contact maker than required by the open circuit system, but it takes more current should the circuit be left open. With the motor closed, the battery will be discharged at a rate limited only by the resistance of the primary circuit."

Cars Must Keep Moving

Chicago Loop Cleared of Standing Vehicles by New City Regulation

During Rush Hours Vehicles Cannot Remain on Car Lines

CHICAGO, May 1—Chicago's loop district came under what might appropriately be termed "martial law" this morning at 7 o'clock and remained so until 10 so far as motorists were concerned. There will be another period this afternoon from 4 until 7 o'clock and every week day thereafter during those hours. Reason: The going into effect of the new non-parking law which makes stopping of any vehicle on a car line street within the loop during the hours specified, except to take on or discharge its load, a misdemeanor.

From three to a half dozen mounted police in each block kept close scrutiny on all vehicular traffic. If a motorist stopped his car and started to leave it he was gently but firmly reminded that the new ruling was in effect. Occasionally a motor car was to be seen parked at the curb in front of some office building, and around it were two or three mounted police. Pedestrians paused and waited to see what action the police took with the car owner when he appeared. After a reasonable wait the police would dispatch one of their members to the police department with the license number of the parked car to get the name of the owner. Then the owner was sought out in his office and told he had broken the law and that his car must be moved.

Excuses were varied. One car owner, whose machine had been in front of a building for 2½ hrs. disclaimed knowledge of how it got there, saying he supposed it was in the garage. The police were inclined to be lenient today because the ruling was not

understood by the public. Frequently one heard a car operator or owner hail a police officer with the query, "Where can I park?"

According to the new ruling a car may be parked on streets having no car line for a period of 30 min., but as there is only one street—Jackson—which has no car line at all, and three or four other places where there is one block with no car line, those in the habit of parking their cars in the loop found it unpleasant this morning, for most of the available places where they could leave their car for even 30 min. were taken early. In the loading zones shown in the illustration, which are designed to give room for two street cars to load and unload at one time, all other vehicular traffic must proceed in single file as near the curb as possible and stop only when told to do so by the traffic officer. The ruling applies to all vehicular traffic, and this traffic is not allowed on the street car tracks unless it is necessary to pull on the tracks to pass another vehicle that may be loading or unloading at the curb. However, as soon as such vehicle is passed the other vehicle must pull off the car tracks to hug the curb.

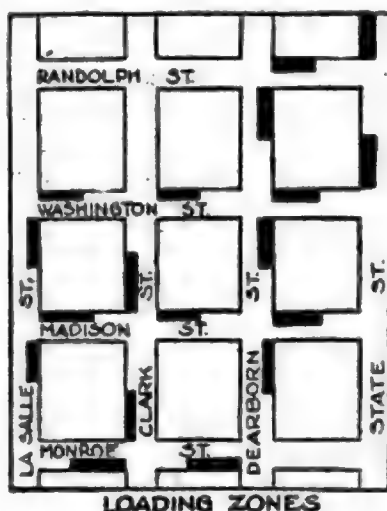
LOCOMOBILE STATEMENT

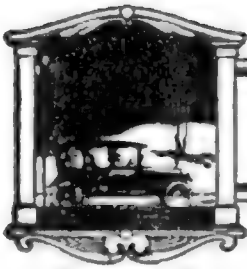
New York, May 1—Special telegram—Locomobile's statement of March 31 shows cash and debts receivable as \$1,110,632; profit and loss surplus, \$1,585,903; total assets and liabilities, \$15,218,431.

120 SALES AT MILWAUKEE SHOW

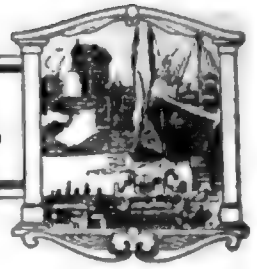
Milwaukee, Wis., April 28—The results of the first annual Used Car Congress, April 20-26, more than justified the expense incurred and induced the most serious consideration of the idea of holding a similar exposition in this city at least twice a year, and probably four times year, according to the board of managers of the Milwaukee Automobile Dealers, Inc. It is estimated that more than 175 cars were actually sold as the result of the show, and of this number 120 sales were made on the floor of the Auditorium.

Every car shown in the Auditorium first underwent a thorough mechanical inspection. Each was required to bear the inspection committee's tag before passing the gate. All cars also bore a large tag showing the name, model, year, motor number, and the resale price. In every case of a sale, the seller used a uniform order blank provided by the M.A.D. This was a conditional sales contract which gave the purchaser the option of returning the car within seven days if it did not prove satisfactory. Time payments also were provided for, at such terms as the buyer and seller agreed upon in the individual case. The highest-priced sale was that of a 1916 Cole 8 at \$1,375. Next was a 1915 Marmon at \$1,300. The average was over \$475.





EDITORIAL PERSPECTIVES



Millions for War Motors

THE movement through Government sources, and by organization of motorists, dealers and by states themselves, to get a complete census of all cars available is a very laudatory one, and one which may be extremely valuable in case of emergency. Certainly we should know what used machines we can have, should the emergency arise. England had the men, but not the machines, and had to have some means of moving them. America has not the men and does not need at this time to rely on private or commercial vehicles.

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IT HAS been said many times that the motor vehicle was the salvation of Paris, and this is true. By pressing into instant service every vehicle that could be obtained by organizing a transport over night practically, the German tide was turned almost at the city gates of Paris, but had Paris or the French army had the proper complete transport system in shape and in operation, in all probability Paris would never have had to be saved by such last-minute methods.

THAT Uncle Sam is planning to utilize every motor resource of the country in the forceful prosecution of the war at last seems to be definitely shown by the action this week of the Appropriations Committee of the House of Representatives in reporting out a bill which provides \$160,000,000 for war transportation purpose alone, in addition to which nearly \$4,000,000 is appropriated for armored motor cars. In the war transportation appropriation, one of the chief items is the allowance for motor cars and trucks.

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THE Government's realization of the need of roads for national defense is indicated in the item of more than \$5,500,000 for roads, wharves and drainage and it is anticipated that the major portion of this will be utilized in road section is mentioned specifically in the \$11,000,000 appropriation provided for aviation. It is understood that this appropriation has the backing of the general staff of the army and navy, and it is hoped that Congress as a whole will see fit to make the bill a law within a very short time.

Highways for Defense

WITH the coming of war the country has awakened to the value of good highways as a means of defense and during the last few weeks good roads agitation has kept pace with the growing realization that motor roads would be a tremendous factor in the military strength of the United States.

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GOOD roads meetings are being called in most of the states and the people are looking for action by their legislature for the appropriations for building and maintaining thoroughfares which would have a military significance. The Illinois campaign for a \$60,000,000 state-wide bond issue and the acceptance by the motoring public of the doubling of the state license fee is only one of the instances of this movement. Wisconsin's new road measure, in which an action similar to that of Illinois is being taken, is another instance. Among the southern states

waking up to the good road necessity, Alabama is the foremost. Senator John H. Bankhead of the Senate committee on postoffices and post roads sums up the need of roads as follows:

"It may be that I can be of the most service to my country, whether in war or in peace, by promoting in every possible way the building of better roads."

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NEW JERSEY is raising \$15,000,000 by the adoption of a one-mill tax for state road purposes, which is to be expended under the direct supervision of General George W. Goethals, the Panama Canal builder, who has accepted the post of state highway engineer. In California the first public utterance of Governor William D. Stephens calls for "federal, state and county co-operation in the construction of military roads for coast protection and for defense in other ways."

Must Train Military Drivers

MOTORISTS whose patriotism and willingness to do their bit in the service of their country exceeds their knowledge of actual war conditions and military needs have had the feeling that the government has not utilized its resources as quickly as it should by the fact that it has not yet made definite arrangements for the service of passenger car and truck drivers who are civilians and has not seemingly made any special effort toward enrolling corps of drivers for military service. As pointed out in MOTOR AGE last week, the country will have motor trucks for military purposes more rapidly than proficient drivers can be trained.

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IT IS this very fact that has been the cause of the seeming delay in making provision for enrolling and training drivers. Until last week, when the selective draft bill was made a law, the machinery for such enrollment could not be arranged. Doubtless the military authorities and the civilian boards connected therewith, such as the Motor Transport Division of the Council of National Defense, are arranging for just such a move as the motorists at large have been awaiting, but so far there has not

yet been established any real machinery for recruiting and training men to become competent drivers of military vehicles.

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AT FIRST glance one would naturally assume that in the organization of motor transports for military work one of the smallest troubles would be to obtain an adequate supply of reliable drivers. But it proved a hard task in France and England and the indications are that there will be difficulty in America. There are good reasons for this.

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UNCOMPLIMENTARY as it may sound, the average driver of a passenger car is not a very good truck driver, particularly in emergencies. The truck driver ordinarily operates on city streets, where he has had little experience with serious road difficulties and never is very far from skilled help. Also, with some few exceptions, truck drivers are not amenable to military regulations and restrictions to the extent that they would have to become in service, and the volunteer passenger driver who has been accustomed to follow his own sweet will in the care and guidance of his car perhaps is even less so.

Work of Council of National Defense

What the Organization Is and What It Does

WASHINGTON, D. C., May 1—The work of the Council of National Defense is so important and so little understood in these war days that the scope of the organization formed Aug. 29, 1916, means much more to the public to-day than at its formation. It is not generally understood that under the name of Council of National Defense there are really two organizations as follows:

1 There is the Council of National Defense, consisting of the Secretary of the War, the Secretary of the Navy, the Secretary of the Interior, the Secretary of Agriculture, the Secretary of Commerce and the Secretary of Labor.

2 There is an Advisory Commission, consisting of seven civilians whose duty it is to advise the Council of National Defense as outlined in paragraph 1.

The Council of National Defense as established last August was formed for the co-ordination of industries and resources for the national security and welfare. The Council has to supervise and direct investigations and make recommendations to the president and the heads of executive departments as to the location of railroads with reference to the frontier of the United States so as to render possible concentration of troops and supplies for defense purposes, the co-ordination of military, industrial and commercial purposes in the location of extensive highways and railroads; the utilization of waterways; the mobilization of military and naval resources for defense; the increase of domestic production of articles and materials essential to the support of armies and of people during interruption of foreign commerce; the development of sea-going transportation; data as to amounts, location, method and means of production and availability of military supplies; the giving of information to producers and manufacturers as to the class of supplies needed by the military and other services of the government, the requirements relating thereto and the creation of relations which will render possible in time of need the immediate concentration and utilization of the resources of the nation.

The Advisory Commission consists of seven who serve without compensation but are allowed expenses of travel and subsistence when attending meetings of the commission or engaged in investigations pertaining to its activities. The Advisory Commission is composed as follows: Chairman, Daniel Willard, having to do with transportation and communication; Howard E. Coffin, Hudson company, in charge of the

ing, including standardization and industrial relations; Bernard M. Baruch, a New York capitalist, chairman of the committee in charge of raw materials, minerals and metals; Samuel Gompers, labor leader, chairman of the committee on labor, including conservation of health and welfare of workers; Julius Rosenwald of Sears Roebuck & Co., mail order house, chairman of committee on supplies, including food, clothing, etc.; Dr. Hollis Godfrey, chairman of the committee on scheme and research including engineering and education; Dr. Franklin H. Martin, chairman of the committee on medicine including general sanitation.

The Advisory Commission of the Council of National Defense has its headquarters in the Munsey Building here, from where all of its activities are directed. Only \$200,000 has been appropriated to date for the Council of National Defense, but owing to there being much volunteer assistance given it is possible to accomplish great things with this small appropriation. Already much has been done as a result of the organization of this council and its advisory commission. Some of the accomplished activities are as follows:

A An industrial inventory of 27,000 large factories for military purposes, this work having been directed by Howard E. Coffin for the Naval Consulting Board but turned over to the Council of National Defense.

B The appointment of a Munitions Standards Board on which are several men connected with the manufacture of munitions as follows: Frank A. Scott, Cleveland, Ohio; W. H. Vandervoort, Moline, Ill.; E. A. Deeds, Dayton, Ohio, and others. All these men have had practical munition manufacturing experience during the last two years. All of them are devoted

ing a good portion of their time to the work and have offices with the Council of National Defense, this city.

C The organization of the committee of the leading telephone and telegraph companies of the country, headed by Theodore N. Vail, of the American Telephone and Telegraph Co., to insure to the Government rapid and efficient telegraph and telephone service in the event of war.

D Mr. Baruch has for the council made large purchases of copper and other materials for the government at favorable prices.

E A medical section has been established to card-index qualified medical and surgical practitioners for the enlargement of the medical reserve corps, and the establishment of an organization for the standardization of hospital and medical supplies.

F A commercial economy board has been established to mobilize the commercial interests of the country for effective and economical distribution of commodities throughout the civilian population. A. W. Shaw, Chicago, heads this board, and is assisted by Edwin F. Gay of Harvard University and Wallace D. Simmons, St. Louis.

G A munitions board has been established.

H Robert C. Hoover has been made chairman of a committee on food supply and prices. Mr. Hoover has handled this work in Europe and is ideally qualified for it.

I A motor transport committee for emergency furnishing of motor trucks and motor cars has been appointed with Alfred Reeves, chairman, assisted by Coker F. Clarkson, A. G. Batchelder, Roderick Stephens and others.

The Council of National Defense already has accomplished much in co-ordinating the different industries, and each week finds it broadening out in its activities. It is serving as a connecting link between the various government departments and the industries. It is selecting the best men for different positions and bringing these to the attention of the government. Naturally the recommendations of the Advisory Commission with regard to civilians is seriously considered by the government departments. The Advisory Commission looks at all matters through the industrial eye. When a representative of the motor industry has to be appointed the recommendations naturally come through the Advisory Commission which makes it a part of its duty to see that the man thus qualified are brought to the attention of the council for appointment.

BIJUR INCREASES CAPITAL

Albany, N. Y., April 27—The Bijur Motor Lighting Co. has increased its capital from \$650,000 to \$2,000,000.

SEIBERLING ON WAR COMMITTEE

Akron, Ohio, April 27—F. A. Seiberling, president of the Goodyear Tire & Rubber Co. and a director of the Chamber of Commerce of the United States, has been appointed chairman of a new wartime committee of the National Chamber. Mr. Seiberling's committee is to investigate and recommend a plan for taking care of the dependent families of soldiers engaged in the present war.

How You Can Do Your Bit

An Outline of What Is Expected of You if You Are a U. S. Volunteer

MANY thousands of car owners, mechanics and others directly connected with the motor car in some capacity are eager to do their bit for the country, but a large percentage of these are handicapped by lack of knowledge as to what branch of the service affords them the greatest opportunity for giving to their country that special knowledge which is theirs. Ultimately there will be a large force of mechanics, perhaps civilian car owners, needed, but the plans for enlisting men of this class are indefinite so far, although there will be work started along these lines in the very near future. Officials from Washington are expected in Chicago soon to begin recruiting truck drivers, but information will not be forthcoming for a week or more.

In the meantime it is the duty of every citizen to acquaint himself with the different branches of the national defense. The average man knows very little of the steps necessary to enlist, of what is expected of him once he does enlist, or of what actual service means. It takes war brought right to our doors to bring this realization of its meaning to most of us. Many of the citizens of the disputed territories in Europe probably know what service means, even though they are not actively in it for they are in close contact. We in this country can and should know the details of enlistment. We should know that we can tell others, who, not because they are slackers, but because they have little if any knowledge of the procedure of enlistment in any branch of military or naval defense of our country, have not answered the country's call. Briefly, here are the qualifications one must possess to enlist in the various branches of the army or navy:

THE ARMY

Citizens of the United States up to forty years old are eligible for enlistment in the infantry, artillery or cavalry. There is no minimum age, but those under eighteen must have the consent of their parents or guardian. They must be of good moral character, pass a rigid physical examination and show no defects in sight, hearing, arches, etc., in other words, be free from physical imperfections. They must enlist for the period of emergency, that is, until peace shall have been declared. Married men are not taken now, especially if they have dependents. The particular branch of the army which appeals most to the recruit is the one to which he is assigned.

After passing the physical examination,

and by the way there are hundreds of applicants rejected in each recruiting office or station, the volunteer is sent to training barracks, where, for periods varying from a week to a month, he is instructed in military drills and training, after which he is assigned to some station where a regiment of cavalry, infantry or artillery is being brought to war strength. Here he undergoes further training and ultimately becomes an efficient soldier.

UNITED STATES MARINES

Marines are not in the army, though they perform military duty. They belong to the naval service and perform the soldier duty in the navy. For this reason they are sometimes called "sea-soldiers." They are known as marines because they are members of the Marine Corps, an organization of 17,400 trained men whose special duty it is to protect the interests of the United States in any part of the world. They serve both on land and sea, at home and abroad. They are the first to land from the battleships; they precede the regular regiments of the army in landing on foreign shores. To enlist in the Marine Corps an applicant must be not less than 5 ft. 4 in. nor more than 6 ft. 1 in. in height; weigh not less than 128 lbs. nor more than 233 lbs. and be between the ages of 18 and 35 years. He must be unmarried and have no one dependent upon him for support. All enlistments are for four years.

The applicant must pass an examination to prove his intelligence and morality and be free from disease or bodily ailments. If he is accepted he is given training for about three months after which he is available for call to go to any part of the world to defend and protect the interests of the United States.

THE NAVY

Male citizens sixteen to thirty-five years old, married, or unmarried, are eligible for enlistment in the navy, but those under eighteen must have the consent of parents or guardian. The period of enlistment is four years except for those between seventeen and eighteen, who are enlisted only for the period of their minority. The minimum height for a man of twenty-one is 5 ft., 4 in. and the minimum weight 128 lbs. A chest expansion of less than 2 in. in a minor and 2½ in. in an adult is sufficient cause for rejection. All enlisted men must be physically sound, have good eyesight and hearing.

Young men from seventeen to twenty-five, who are not skilled in any naval trade are enlisted as apprentice seamen. Immediately upon being sworn in at the recruiting station, they are sent, at government expense, to a naval training station, either at Norfolk, Va., Newport, R. I., Great Lakes, Ill., San Francisco, Cal., Portsmouth, N. H., or Washington, D. C. The first three weeks at the training station the recruit is put in a detention camp where he is kept under observation to make sure he has brought no contagious disease into the camp and at the same time is assigned to a company and drilled under a petty officer. After three weeks he goes to the main barracks, where the course of instruction is more extended. Drills, duty and study periods take up a part of each week day, but there is ample time for recreation and athletics. Reveille is sounded at 5 a.m. that all recruits may be mustered at 5:30 a.m. From then until 7 o'clock they clean their clothes and camp. Breakfast is over at 8 a.m. and from then until 3:15, except for dinner at noon, the time is given to drills, study and instruction. From 3:15 to 6 o'clock is devoted to athletics and amusement. Supper is at 6 o'clock and all are required to be in their hammocks at 9 o'clock. After the training is completed the recruit is advanced according to his earned rating and is then ready to be transferred to the ships of the navy.

OFFICERS' RESERVE CORPS

Infantry, Cavalry, Artillery

Beginning May 8 training will start for 10,000 officers for the first half million troops of infantry, cavalry, field artillery, engineers' and coast artillery corps to be called to the colors, there being four camps, each of which will handle 2500 men. These camps will be located as follows:

Fort Benjamin Harrison, Ind., two camps under one command, one being for Ohio and one for Indiana and Kentucky.

Fort Sheridan, Ill., two camps under one command, one for Illinois and one for Michigan and Wisconsin.

Fort Snelling, Minn., one camp for Minnesota, Iowa, North Dakota, South Dakota and Nebraska.

Fort Riley, Kan., one camp for Missouri, Kansas, Colorado and Wyoming.

The object of these camps is the training and selection of officers for a full division and one additional cavalry regiment. The maximum number that can attend each camp is 2500. These will be divided into

fifteen infantry companies for the first month and all trained alike. At the beginning of the second month they will be organized into nine infantry companies, two cavalry troops, three artillery batteries and one engineer company for the remaining two months of training. After the training comes to an end officers will be selected for one regiment from each organization and the remainder will be appointed as additional reserve officers, if competent.

To be eligible one must be either a reserve officer of the infantry, cavalry, field artillery, coast artillery, engineer corps; member of the reserve officers training corps and over twenty years nine months old; a cadet of the same age; a graduate of military schools or a civilian between twenty years nine months and forty-four years of age. Also one must pass an examination as to character and sobriety, be of good repute in his community, be likely to command respect of officers and enlisted men and have adequate education. Preference will be given men of valuable military experience. All expenses incident to attendance will be borne by the government.

OFFICERS' RESERVE CORPS Aviation Section

To enter this branch of the national defense the applicant must pass a rigid examination as to his physical fitness and his mental and moral standing. He must be vouched for by three reputable citizens and furnish several letters of recommendation, all of which, together with the schools which he attended and his business experience are carefully investigated by the chief signal officer's office in Washington. The physical test for this branch is perhaps the most rigid of any in either the army or navy and it is said that a commission of first lieutenant, which is the rank given those who pass, is the best recommendation a man can have of physical, moral and mental fitness. As soon as the applicant is accepted he is made a sergeant with a sergeant's pay of about \$90 a month to sustain him during the three to six months of training, when he is given his commission as a first lieutenant and discharged subject to call when the country needs him.

If the applicant does not wish to enlist he may attend the course as a civilian at his own expense. He will be assigned to a school for instruction, which may be a government or civilian school, and when he becomes proficient he will be given his commission without further examination. It is the intention gradually to organize reserve aero squadrons in various parts of the country from the commissioned and enlisted reserve personnel.

6,200 EMPLOYEES JOIN RED CROSS

Buffalo, N. Y., April 27—Last week 6200 employes and officials for the Pierce-Arrow Co. joined the American Red Cross. The soliciting of members added \$8,600 to the Red Cross fund.

Speedometer Makers Out Stewart-Warner Employees Demand Woman in Enlisted Man's Place Be Ousted

Officials Close Plant Until Adjustment Can Be Made

CHICAGO, May 1—Employers who attempt to fill with women places in factories vacant by reason of men enlisting may run afoul of labor troubles on the part of the other male employees, if the strike now on at the Stewart-Warner Speedometer Corp. plant may be taken as a criterion. An employee of the company resigned the day the draft law was passed and the management placed a woman in his position. Fifteen employees of that department walked out and several other departments did likewise the following day. Women employees joined in the demand that women be given men's pay for men's work.

"We employ women in many departments," said Charles B. Smith, general manager, "and since the man who left did so to enlist it is likely that if a man were placed in his position he too would be called when the draft law becomes effective. We shall use women wherever they can do the work. We closed down the plant for a few days until some adjustment can be made, but we expect to be operating again before the week is over."

Three thousand employees are affected by the shutdown. Officials see no reason why they should accede to demands made that the woman put in the man's position be discharged. Stewart-Warner stock dropped from 79 to 75 to-day, although whether or not this was due to the strike is not traceable.

BATTERIES BY THE MILE

Chicago, April 30—An innovation in selling plans for electric cars will be put into effect in Chicago May 1, when Harry Salvat, owner of the Fashion Garage and newly-appointed Chicago distributor for the Milburn electric, begins a service to new Milburn owners on a mileage basis. Two models of passenger and a 750-lb. delivery wagon will be sold, all without batteries. Service stations will be maintained throughout the city where the car owner can exchange his discharged battery for a charged one on a payment of 5 cents per mile traveled on the old battery.

The electrica will have a hub odometer and the owner will be furnished with a slip which will show the mileage at the previous exchange. He will present this and be charged 5 cents per mile for the difference between the previous and present reading. Service stations will re-charge the batteries and for this and the service of changing will receive 48 per cent of the amount they collect from the owner.

Salvat believes this will eliminate much of the objection to high garage charges since the owner can keep his car wherever he likes at about one-fourth the cost of keeping it in an electric garage and having to pay a flat rate for garaging and charging the batteries. In other words, the car owner pays only for the amount of mileage he gets out of the battery. The batteries will drive the car about 65 miles on one charge.

TO SERVE THE COUNTRY

Edwin Denby, treasurer of the Denby Motor Truck Co., and ex-president of the Detroit Board of Commerce, has enlisted as a private in the marine corps.

George D. Wilcox, sales manager of the Commerce Motor Car Co., has been offered a captaincy in the reserve corps of the quartermaster's department of the United States Army.

James E. Morgan, secretary and treasurer of the Wallace C. Hood service bureau, has been assigned to the first division of the United States Navy and is in service on the battleship Iowa. H. G. Moesta, special representative of the bureau, has been transferred for service on United States steamship Columbia, which entered active service April 21 as flagship for the Atlantic submarine flotilla.

AT CURTISS AVIATION SCHOOL

Newport News, Va., April 26—Esten B. Koger, formerly identified with the Oakland and Cadillac racing teams on the coast, is now at the Curtiss Aviation School here taking a course in aviation and will qualify soon for an expert pilot's license in the Signal Enlisted Reserve Corps as a lieutenant in the aviation section. For the last three years Koger has been the eastern sales engineer for the Master Carburetor Corp. of Los Angeles and Detroit. He also has been with Hamley-King & Co., Oakland and National distributor for Los Angeles and Southern California.

Lawrence P. Schenck, formerly manager of the Mitchell branch in Philadelphia, is taking a course at the aviation school also and will take the tests for a commission in the reserve corps soon. Among the prominent Philadelphia motor car men here to qualify for commissions in the aviation section of the corps is H. W. French of the Studebaker; Frank A. Dickman, assistant sales manager for the Buick, and Sam Eckert of the Sun Oil Co. The school has seventy students, many of whom are motor car men from all parts of the country.

BRISCOE OFFERS SERVICES

Detroit, April 30—Frank Briscoe, who recently resigned from the Briscoe Motor Corp., has offered his services to Washington through the Society of Automotive Engineers and has been called East for a conference.

















Landmarks



Remains of the old Shawnee mission, 3 miles out of Kansas City, established by Methodist Episcopal church in 1829. This is on National Old Trails



The historic Harris house, Westport avenue and Penn street, Kansas City, where gold-seekers awaited the fitting out of expeditions

Days of the 'Forty-Niner Recalled by Association with Structures on National Old Trails

AS THE traveler comes into or goes out of Kansas City over the route of the National Old Trails road through the old Westport district he can see, and he more likely will not see, an old brick building that is the Harris House of 'Forty-Westport avenue and Penn street. This building is the Harris House of 'Forty niner fame. Westport was then the beginning of the journey by land to the far West; to the land of gold and wealth. Many a young man, blessed or burdened with the lust of gold and adventure, fresh from a home of Eastern refinement, lodged here in the last lap of his western trip. Many a famous man has left on record his experiences at this hospitable hostelry. Washington Irving, Horace Greeley, Senator Benton, General Fremont are among the names of those who stopped here. General Fremont left his wife at the Harris House for many months at a time while he was away on his expeditions in the far West. Francis Parkman, in "The Oregon Trail," describes the little settlement of Westport and, in all probability, he spent many hours in the office room of the Harris House talking to men and women who were waiting for their outfits to be completed before resuming their journey. The hotel was Gen. Curtis' headquarters during the battle of Westport which was fought Oct. 21-23, 1864. General Curtis watched the progress of the fighting from the roof of the building until he took charge in person. The hotel was operated by John Harris till the latter part of 1864. Since that time it has drifted from one renter to another. The ground floor is occupied by shops, but the other floors have not been used for several years.

The Harris House stands in the light of days gone past with as brilliant a record as many of our skyscraping hotels of to-

day may be able to boast of in sixty or seventy years.

Shawnee Mission

Three miles southwest of Kansas City on the main line of the National Old Trails road may be found two brick buildings, the remains of the famous Shawnee mission. The mission was established in Shawnee in 1829 by the Methodist Episcopal church as a training school for the Shawnee Indians. In 1839 the Government granted the mission a tract of 2240 acres in another section of the county, where the buildings are now located. The mission property originally included some dozen buildings and the mission settlement was a town in itself. The building used as a dormitory and the one used as the school are the only buildings remaining. The cost of the buildings and improvements amounted to more than \$75,000. The

brick came from St. Louis and the lumber was shipped from Cincinnati.

These buildings were on the original route of the old Santa Fe trail and every day saw a number of freighter outfits starting out on their long journey to the Southwest.

The Bogus Legislature of Kansas, so famous during the days of Border troubles, met in these buildings in 1855. The mission continued in operation until 1862. Some plans have been made by patriotic societies of Kansas City toward purchasing the property and maintaining an Historical Inn of the Western Territory, but nothing definite has been done. It should be a spot of great attraction for cross-country tourists as well as citizens of the states of Kansas and Missouri, for the buildings are themselves the very spirit of the progress of the western country.

Answers to Route Information Inquiries

Chicago—Yellowstone—Seattle, Wash.

OSHKOSH, Wis.—Editor MOTOR AGE—Give route from Chicago west to Denver through Cheyenne to Yellowstone Park, north to Glacier Park, thence to Spokane and Seattle, Wash.—A. C. Denniston.

From Chicago, proceed to Sterling, Hillsdale, Watertown, Moline, Davenport, Ia., Durant, Iowa City, Oxford, Marengo, Victor, Kellogg, Altoona, Des Moines, Van Meter, Adair, Atlantic, Oakland, Omaha, Louisville, Havelock, Lincoln, Milford, Fairmont, Hastings, Minden, Atlanta, Oxford, Arapahoe, Cambridge, McCook, Culbertson, Lamar, Neb., Holyoke, Colo., Sterling, Fort Morgan, Greeley, Brighton, Denver, Greeley, Eaton, Dover, Cheyenne, Wyo., Chugwater, Wheatland, Uva, Glendo, McKinley, Orin Jet., Douglas, Glenrock, Casper, Johnsons Ranch, Powder River, Hells Half Acre, Waltman, Armito, Los Cabin, Reids Ranch, Thermopolis, Basin, Otto, Burlington, Cody, through Sylvan Pass to Lake Station, Gibbon Station in Yellowstone Park, to Yellowstone, Mont., Hutchins Ranch, Ennis, Virginia City, Twin Bridges, Butte, Deer Lodge, Drum-

mond, Bearmouth, Clinton, Missoula, Arlee, Ravalli, St. Ignatius, Ronan, Dayton, Rollins, Somers, Kallispell, Belton, Appar, Glacier National Park, Kallispell, Rollins, Elmo, Polson, Ravalli, Missoula, Huson, Alberton, St. Regis, DeBorgia, Wallace, Kellogg, Cataldo, Coeur d'Alene, Spokane, Wash., Spangle, Rosalia, Steptoe, Colfax, Wilcox, Dayton, Waitsburg, Walla Walla, Wallula, Burbank, Pasco, Kennewick, Richland, Prosser, Grand View, Sunnyside, North Yakima, Selah, Ellensburg, Easton, Snoqualmie Pass, North Bend, Fall City and Seattle.

Springfield, O.—Atlantic City, N. J.

Springfield, O.—Editor MOTOR AGE—We desire the following routes: 1—Springfield, O., to Pittsburgh, Pa., to Atlantic City, N. J., to Washington, D. C.; 2—Springfield, O., to Niagara Falls; 3—Springfield, O., to Pittsburgh, Pa., taking in Lancaster, Pa.—P. T. Rathbun & Co.

From Springfield, O., proceed to Columbus, Newark, Linville, Zanesville, Cambridge, Bridgeport, Wheeling, W. Va., Washington, Pa., Canonsburg, Bridgeville, Carnegie, Pittsburgh, Wilkinsburg, Greensburg, Ligonier, Bedford,

Everett, McConnellsburg, Chambersburg, Gettysburg, Abbottstown, York, Lancaster, Coatesville, Bryn Mawr, Philadelphia, Camden, Hammononton, Absecon, Atlantic City, Franklinville, Woodstown, Pennsboro, N. J., Wilmington, Del., Elkton, Bel Air, Baltimore, Elkridge, Laurel, Hyattsville, Bladensburg, Washington D. C.

A detour may be made from Pittsburgh to Niagara Falls by proceeding to Harmony, Mercer, Meadville, Venago, Waterford, Erie, Harbour Creek, North East, Ripley, N. Y., Westfield, Brocton, Fredonia, Irving, Farnham, Buffalo, Niagara Falls. Niagara Falls may be included in your return trip by proceeding from Washington, D. C., to Baltimore, Philadelphia, Trenton, N. J., Jersey City, New York, Albany, Utica and Buffalo, then going to Pittsburgh via the route outlined above.

Vols. 3, 4 and 1 of the Automobile Blue Book, published by the Automobile Blue Book Pub. Co., 910 S. Michigan Ave., Chicago, contain complete running directions for these trips.

Indianapolis—Washington—New Haven

Frankfort, Ind.—Editor MOTOR AGE—Give routing from Indianapolis to include Gettysburg, Washington, Annapolis, Baltimore, then to New Haven, excluding New York, returning by way of Niagara Falls.—Russell T. Gard.

From Indianapolis, proceed to Greencastle, Dunreith, Germantown, Richmond, Eaton, O., Dayton, Harshman, Springfield, Columbus, Granville, Newark, Lincolnton, Zanesville, Cambridge, Bridgeport, Wheeling, W. Va., Elm Grove, Washington, Brownsville, Uniontown, Hopwood, Farmington, Grantsville, Cumberland, Hancock, Hagerstown, Frederick, Emmitsburg, Gettysburg, Pa., Littlestown, Smallwood, Cooksville, Brightwood, Washington, D. C., Beltsville, Laurel, Baltimore, Kingsville, Bel Air, Aberdeen, Perryville, Charlestown, Elkton, Newark, Del., Wilmington, Marcus Hook, Pa., Chester, Norwood, Darby, Philadelphia, Jenkintown, Hatboro, Buckingham, Labertville, N. J., Flemington, Somerville, Bedminster, Morristown, Parsippany, Montville, Mountain View, Pompton, N. J., Suffern, N. Y., Spring Valley, Nyack, Tarrytown, Kitchawan, Yorktown Heights, Somers, Brewster, Danbury, Newtown, Derby, New Haven, Waterbury, Danbury, Mill Plain, Pawling, Beekman, Arlington, Poughkeepsie, Rhinebeck, Clermont, Hudson, Kinderhook, Rensselaer, Albany, Schenectady, Amsterdam, Fonda, Little Falls, Herkimer, Utica, Chittenango, Manlius Center, Syracuse, Camillus, Auburn, Seneca Falls, Waterloo, Geneva, Canandaigua, Lima, Batavia, Buffalo, Tonawanda, Niagara Falls, thence back to Buffalo, and on to Fredonia, Westfield, Erie, Conneaut, Cleveland, Mansfield and Columbus, from which point the first part of the route is repeated.

Vols. 4, 3, 2 and 1 of the Automobile Blue Book, published by the Automobile Blue Book Pub. Co., 910 S. Michigan Ave., Chicago, contain complete running directions for this trip.

Jackson, Mich.—Pittsburgh—New York

Jackson, Mich.—Editor MOTOR AGE—Give route from here through Pittsburgh, Washington, Philadelphia, New York, Boston and back through the Berkshires.—Subscriber.

From Jackson, Mich., proceed to Holt, Mason, Jackson, Napoleon, Manchester, Clinton, Tecumseh, Palmyra, Blissfield, Ottawa Lake, Sylvania, O., Toledo, Leymoine, Pemberville, Fostoria, Crawford, Upper Sandusky, Marion, Delaware, Columbus, Granville, Newark, Jacksonstown, Lincolnton, Zanesville, Cambridge, Bridgeport, Wheeling, W. Va., Washington, Pa., Houston, Canonsburg, Bridgeville, Carnegie, Pittsburgh, Wilkensburg, E. McKeesport, Adamsburg, Greensburg, Ligonier, Bedford, Everett, McConnellsburg, St. Thomas, Chambersburg, Gettysburg, Emmitsburg, Thurmont, Frederick, Ridgeville, Damascus, Gaithersburg, Bethesda, Washington, D. C., Beltsville, Mulhark, Laurel, Baltimore, Kingsville, Bel Air, Churchville, Aberdeen, Havre de Grace, Perryville, Charlestown, North East, Elkton, Newark, Wilmington, Marcus Hook, Chester, Norwood, Darby, Philadelphia, PARRY, Moorestown, Mt. Holly, Pemberton,

Wrightstown, New Egypt, Cassville, Lakewood, Adelphi, Freehold, Marlboro, Matawan, South Amboy, Perth Amboy, Rahway, Elizabeth, Newark, Jersey City, Weehawken, New York, New Rochelle, Larchmont, Mamaroneck, Rye, Port Chester, Greenwich, Cow Cob, Stamford, Darien, Norwalk, Westport, Southport, Fairfield, Bridgeport, Stratford, Milford, New Haven, North Haven, Wallingford, Tracy, Meriden, Berlin, Hartford, East Hartford, Warehouse Point, Enfield, Thompsonville, Conn., Longmeadow, Mass., Springfield, N. Wilbraham, Warren, W. Brookfield, Brookfield, Spencer, Leicester, Worcester, Shrewsbury, Northboro, Marlboro, So. Sudbury, Wayland, Weston, Auburn-dale, Newton, Boston, Cambridgeport, Medford, Everett, Revere Beach, Lynn, Swampscott, Salem, Beverly, N. Beverly, Wenham, S. Hamilton, Hamilton, Ipswich, Rowley, Newburyport, Salisbury, Smithtown, N. H., Hampton Falls, Hampton, Little Boards Head, Rye Beach, Portsmouth, Kittery, Me., York Corners, York, York Harbor, York Beach, Ogunquit, Wells, Kennebunk, Biddeford, Scarborough, Portland, Allens Corners, West Falmouth, Gray, Dry Mills, Sabbath Day Lake, Poland Spring, Poland, Cocks Mills, Naples, Bridgton, East Fryeburg, Fryeburg, Center Conway, Redstone, North Conway, Intervale, Glen, Bartlett, Bemis, Bretton Woods, Bethlehem Jct., Maplewood, Bethlehem, Littleton, Lisbon, Bath, N. Haverhill, Harverhill, Piermont, Orford, Lyme, Hanover, W. Lebanon, White River Jct., No. Hartland, Hartland, Windsor, Acuteville, Claremont, North Charlestown, Springfield, Vt., Chester, Simonsville, Londonderry, Manchester, Arlington, Shaftsbury Center, Bennington, Pownal Center, Pownal, Williamstown, Mass., Lanesboro, Pittsfield, Lenox, Stockbridge, Great Barrington, Copake, Ancram, Pine Plains, Rhinebeck, Rhinecliff, Kingston, N. Y.

From Kingston, the tourist may go on to New York or take his choice of a variety of routes back to Jackson.

Webster City, Ia.—Yellowstone Park

Webster City, Ia.—Editor MOTOR AGE—Am interested in trip from here to Yellowstone, prefer going one way via the Black Hills, S. D. Would like to go through Pocatello, Idaho.—S. S. Parkhurst.

We would not advise your going via the Black Hills, but suggest the following: From Webster City, proceed to Fort Dodge, Clare, Unique, Gilmore, Rolfe, Emmetsburg, Ruthven, Dickens, Spencer, Hartley, Sanborn, Sheldon, Hull, Rock Valley, Canton, Harrisburg, Sioux Falls, Dell Rapids, Brookings, Clear Lake, Altamont, Millbank, Big Stone City, Ortonville, Millbank, Twin Brooks, Waubay, Webster, Bristol, Andover, Groton, Aberdeen, Ipswich, Bowdle, Java, Selby, Mobridge, Wapakpa, McLaughlin, Tatanka, McIntosh, Watauga, Morristown, Thunder Hawk, Lemmon, Petrel, White Butte, Haynes, Hettinger, Bucyrus, Reeder, Cascoyne, Seranton, Powman, Rhame, Marmarth, Baker, Plevna, Westmore, Ismay, Mildred, Fallon, Terry, Miles City, Hathaway, Rosebud, Forsyth, Pompeya Pillar, Huntley, Billings, Laurel, Park City, Columbus, Merrill, Big Timber, Hunters Hot Springs, Livingston, Emigrant, Gardiner, into Yellowstone Park, out via Gibbon Station and Yellowstone, Mont., Flat Rock Bridge, Osborn Bridge, Ashton, St. Anthony, Sugar City, Rexburg, Rigby, Idaho Falls, Blackfoot, Pocatello, Inkom, McManmon, Clifton, Dayton, Preston, Whitney, Franklin, Logan, Wellsville, Brigham, Ogden, Peterson, Morgan, Devils Slide, Croydon, Main Forks, Wasatch, Evanston, Dog Springs, Fort Liman, Granger, Bryan, Green River, Rock Springs, Point of Rocks, Tipton, Red Desert, Wamsutter, Rawlins, Fort Steele, Walcott, Hanna, Carbon, Medicine Bow, Bosler, Laramie, Tie Siding, Beauford, Granite Canyon, Cheyenne, Egbert, Pinebluff, Bushnell, Kimball, Potter, Sidney, Lodgepole, Chappell, Big Springs, Brule, Ogallala, Paxton, Sutherland, North Platte, Gothenburg, Lexington, Wood River, Grand Island, Central City, Silver Creek, Duncan, Columbus, Richland, North Bend, Ames, Fre-

mont, Hooper, Oakland, Lyons, Winnebago, Homer, Sioux City, Hinton, Merrill, LeMars, Oyens Sta., Remsen, Marcus, Cherokee, Storm Lake, Newell, Fonda, Pomeroy, Manson, Ft. Dodge, Webster City.

Vol. 3 of the Automobile Blue Book, published by the Automobile Blue Book Pub. Co., 910 S. Michigan Ave., Chicago, will give you complete running directions for this trip.

Chicago—Los Angeles, Cal.

Valparaiso, Ind.—Editor MOTOR AGE—Give route from Chicago to Los Angeles.—F. R. Marine.

From Chicago, proceed to Sterling, Hilldale, Watertown, Moline, Davenport, Ia., Washington, Fairfield, Ottumwa, Seymour, Powersville, Mo., Osgood, Gault, Chula, Chillicothe, Utica, Braymer, Polo, Excelsior Springs, Liberty, Bellevue Sta., Kansas City, Overland Park, Lenexa, Edgerton, Ottawa, Agricola, Emporia, Elmdale, Peabody, Walton, Newton, Halstead, Hutchinson, Nickerson, Lyons, Great Bend, Larned, Kinsley, Spearville, Dodge City, Garden City, Deerfield, Lakin, Kendall, Syracuse, Granada, Lamar, Hasty, Las Animas, La Junta, Timpa, Thatcher, Tyrone, Hoehne, Trinidad, Starkville, Ratou, Maxwell, Springer, Colmar, Las Vegas, San Jose, Santa Fe, Domingo, Albuquerque, Magdalena, Datil, Springerville, St. Johns, Concho, Petrified Forest, Winslow, Flagstaff, Grand Canyon, Williams, Ash Fork, Kingman, Needles, Ludlow, Barstow, Victorville, Devore, San Bernardino, Claremont, Glendora, Monrovia, Pasadena and Los Angeles.

Vol. 5 of the 1916 Automobile Blue Book, published by the Automobile Blue Book Pub. Co., 910 S. Michigan Ave., Chicago, contains complete running directions for this trip.

Los Angeles, Cal.—Bangor, Me.

Santa Barbara, Cal.—Editor MOTOR AGE—Give route you can recommend from Los Angeles to Bangor, Me.; also tell where I may obtain auto blue book, and what is the price.—L. M. Campbell.

From Los Angeles, proceed to Pasadena, Monrovia, Glendora, Claremont, San Bernardino, Hesperia, Victorville, Barstow, Ludlow, Amboy, Needles, Topock Bridge, Yucca, Kingman, Hackberry, Peach Springs, Seligman, Ash Fork, Williams, Flagstaff, Winslow, St. Johns, Springerville, Quemado, Magdalena, Socorro, Becker, Albuquerque, Domingo, Santa Fe, from which point follow the Santa Fe trail to Kansas City, thence to Bellevue, Liberty, Pratherville, Excelsior Springs, Lawson, Polo, Cowgill, Plymouth, Chillicothe, Gault, Osgood, Lucerne, Powersville, Sewal, Ia., Seymour, Centerville, Moravia, Blakesburg, Ottumwa, Batavia, Brighton, Washington, Columbus City, Muscatine, Davenport, Moline, Watertown, Hilldale, Erie, Galt, Sterling, Rochelle, DeKalb, West Chicago, Chicago, South Chicago, Hammond, South Gary, Hobart, Valparaiso, Laporte, South Bend, Ind., Mishawaka, Elkhart, Gosben, Kendallville, Edgerton, Bryan, Wauseon, Toledo, Lemoine, Fremont, Bellevue, Norwalk, Wakarusa, Oberlin, Elyria, Cleveland, Painesville, Ashtabula, Conneaut, O., Erie, Waterford, Union City, Corry, Jamestown, Red House, Salamanca, Allegany, Olean, Belvidere, Andover, Hornell, Canisteo, Elmira, Chemung, Waverly, Owego, Union, Ringbampton, Windsor, Bainbridge, Unadilla, Oneonta, Colliera, Worcester, Berne, Clarksville, Albany, Rensselaer, Nassau, New Lebanon, Shaker Village, Pittsfield, Ashfield, Shelbourne Falls, Greenfield, Athol, Gardner, Crookerville, Fitchburg, Groton, N. Chelmsford, Lowell, Lawrence, Haverhill, Amesbury, Newburyport, Somerville, Medford, Everett, Lynn, Salem, Beverly, Ipswich, Newburyport, Salisbury, Hampton, Rye Beach, Portsmouth, Kittery, York Beach, Ogunquit, Kennebunk, Scarborough, Portland, Yarmouth, Brunswick, Bath, Woolwich, Newcastle, West Warren, Rockland, Camden, Prospect, Hampden, Bangor.

Several of the blue books would be required for this trip, which may be obtained from the Automobile Blue Book Pub. Co., 910 S. Michigan Ave., Chicago, price \$3.00 per volume.

Importance of Fan Efficiency

A. K. Schanze Points Out Defects in Water Jacket and Pump Design

IT has been the writer's experience, during the various fan tests that he has conducted on cars of many different makes, to come across three or four apparently ideal water jacket designs. In the main, water jackets leave some room for improvement.

The mere solution of the problem of what volume of water a jacket must contain does not produce the answer to the problem. The distribution of the water layers around the cylinder walls may take on an aspect of even greater importance than the volume. Since ignition takes place in the top of the cylinder, the top is longest exposed to fire and becomes hottest. Modern engineering practice has placed the deepest layer of cooling water over the top of the cylinder, which is as it should be. However, the foundry practice in some cases seems to have interposed stiffening ribs or small columns on top of the cylinder. These act as retarders to the circulation, with the result that steam pockets seem to be formed. This shows itself in some engines whose water jacket volumes are adequate, in the sudden jump in temperature that takes place when the motor stops.

It has come to the author's notice on several occasions in tests that, when the motor was stopped, the temperature recorded by a thermometer placed in the filler cap mounted from 200° F. to 220° F. After losing two thermometers through having them blown out of an improvised bushing in a hole in the filler cap and seeing a jet of steam shoot upward 20 ft. into the air from a radiator that a moment before had not been near the boiling point, we became cautious and observant. Thermometers lashed in place showed that temperatures went to 220° F. Repeated experiments over the same ground could lead only to the conclusion that the whole mass of water was not being raised through that range of temperature in 40 or 50 sec., but some little patch on top of the cylinder was being converted to steam and the filler neck was being used as a steam dome faster than it could act as a relief through the overflow.

Circulating System

This condition or the approach to it seems to have become such a common thing in some localities that the engineers concerned have become used to it and do not lay much stress upon its presence.

Steam above 212° means pressure, and there is no doubt that many a radiator manufacturer has been called upon to replace a leaky radiator that was really not defective in its own right. The danger to human beings lies in the possibility of a clogged overflow pipe, and an unsuspecting person taking a look into the filler neck at the psychological moment.

The water layer, then, over the top of the cylinder should not only be calculated upon a basis of its total volume, but should also be so arranged that the circulation system will handle all of it at a uniform rate, and so that, when the circulating system ceases to function, by virtue of the stopping of the engine, the layer will have a thickness such as to afford sufficient reserve to absorb the heat that remains in the cylinder after the last explosion, and no more heat is being added.

In order to prevent the overheating tendency immediately following the shutting down of an engine, it would seem necessary then to give the water jacket such volume and distribution as to enable it to absorb the last heat accumulations, independent of the circulating system.

ON THESE two pages are given, in part, the paper read by A. K. Schanze, Pittter Fan Co., on "Automobile Engine Cooling" before the Cleveland section of the Society of Automotive Engineers, April 20, a brief account of which appeared in last week's issue. In it Mr. Schanze states that the importance of the fan as a factor in engine cooling is frequently overlooked and its possible efficiency is lost. He also points out the necessity of ample water jackets, especially in engines using the thermo-syphon cooling system and states that in engines which have come under his supervision the radiators and circulating pumps are of such design that the water is all pumped out of the bottom of the radiator and for short intervals there is really no circulation in the engine. The efficiency of multi-blade fans and the good fan as a factor in cutting the cost of radiator manufacture were considered.

Between the pump system and the gravity system of circulation there is at present somewhat of a race for supremacy. From what the writer has been able to observe the two systems appear to show faults that lie at opposite ends of the chart. The pump system frequently overcirculates, or tends to, while the gravity system undercirculates. Both faults are conducive to trouble.

In practically all pump systems the speed of the pump varies with the motor speed. This is logical enough and conforms with good engineering theory and practice. Rotary pumps must attain a certain minimum speed before they do any effective work. This means that the starting point is considerably above zero, say, around 250 or 300 r.p.m. Then their efficiency increases after they get up to 500 r.p.m. and usually goes up on its curve to 800 or 900 r.p.m. The actual result is that when the motor runs at heating speed the pump, which was designed to do its circulating at a 20-m.p.h. car speed is working at high efficiency; the water is thrown up into the top of the cylinder and radiator tank faster than the internal friction of the radiator will allow it to return to the pump. The bottom of the radiator is thus one moment empty and the next full, or it may be simply allowing a small part of the water to pass into the pump and allowing a lot to be lost through the overflow pipes.

Radiator Capacity

When the radiator is thus, in part, deprived of water, it is deprived of its chance to do the full amount of cooling of which it is capable. Overheating, or at least inefficient cooling, results.

It would appear, then, that it might be well to select a pump speed designed to do its circulating within the limits of the radiator frictional resistance and then always run the pump at that one speed regardless of motor speed.

The gravity system of circulation has been used with varying success. At best its impulse is feeble, due to the lack of head. On this account it succumbs readily to any abnormal frictional resistances that may result from solid matter in the water. It, of course, recommends itself because of its simplicity of construction,

its low initial cost, its manifest economy of operation and the advantages derived from the fact that it continues in operation for some time after the motor stops.

Its practical application to the car, in a manner to realize all those advantages is difficult. At present too many of these systems are shaped in almost the same way that the pump system is shaped with pump omitted. Best results in gravity circulation as applied to the heating of dwellings and other buildings are obtained with the horizontal runs are comparatively short as compared with the head. The practical development of the system is still in its infancy and it is out of the question to say at this date anything but words of encouragement to users of the system.

Radiators offer about the largest variety of selection in the industry.

The elements to be looked for from the radiator builder's point of view are numerous, but the engineer whose function it is to select the proper article for his car can be guided by a few details.

After the car architecture has established the shape and the purchasing agent has fixed the cost limit, the designing engineer may go as far as he chooses. Frontal area should be a maximum and upon this follows net radiating area.

Radiating area can be reduced to a horsepower basis, as the act of radiating is exactly the process of doing work. Of the total heat of the engine absorbed by the water, we have only to deal with the small residue that would cause overheating if not carried off by the radiator.

The whole thing can be based upon the premise that a cubic foot of air, in passing through a radiator and being raised 50° F. in temperature has absorbed 1 B. T. U. A horsepower represents 33,400 B. T. U. and upon this basis we can arrive at the other results.

For efficiency only is it necessary to have the air passages free from solder obstructions, but it is just as important that they be of a size and shape that will give a good smooth run to the air. The more air that can be passed through a radiator the more will be its cooling power. We have also to take a careful look at the inside of a radiator to determine its freedom of water circulation and its capacity.

How Cooling Varies

As a practical suggestion to car builders the writer offers that every purchaser be furnished a special card cautioning him to keep the exterior of the radiator clean as he possibly can. Much heating complaint would be avoided if radiators were kept clean. *Tests go to prove that when a film of oil gathers enough road dust the radiator efficiency is reduced to about one-quarter normal.*

Experiments conducted by the writer have confirmed the theory that cooling varies directly with the air quantity drawn through a radiator. Incidentally, similar experiments have shown that the temperature of the water in a radiator fluctuates practically, degree for degree, with the temperature of the air entering the radiator.

First, in the selection of a fan, should be considered the element of quantity of air delivery. The ideal radiator, as has been stated, is the one that will give off its heat at such a rate that the air that passes out of it can absorb no further heat units. In combination with this radiator, the ideal fan is the one which will draw air through the radiator at such a

high velocity that the air undergoes no measurable increase in temperature as it passes through.

At first glance it would seem as though this statement of the case partook of the old school-day problem of the irresistible force striking the immovable body, but closer inspection will reveal the fact that it is not quite that way.

The fan is the only link in the chain that can be made of practically unlimited power without throwing the system out of balance. Incidentally, it may be remarked that fan manufacturers have the world still to conquer in that respect.

Fans of any one design increase their capacities in an approximate geometric progression with the increase in diameter. Best practice would therefore suggest the use of the largest diameter possible on any particular model of fan.

There are several distinct types of fans offered by the various manufacturers, classified for description as follows: Rim fans, which are those whose periphery is bound by a circular rim; flat-blade fans, which are usually of three or four flat blades built out from a central spider; curved-blade fans, which are similar in construction to the flat blade fans except that the blades are curved somewhat after the manner of a garden trowel; and the multi-blade fans, which are of two or more arms, up to six, and in which each arm consists of two or more blades.

Taking them in the order named, we note two types of rim fans, viz., those having a very thin rim almost like a wire, and those having a broad rim equal in width to the sweep clearance of the blades. In the former type, as nearly as the writer can ascertain, the rim is supposed to add strength both in the resistance to centrifugal force and in the resistance to bending. It is also intended somewhat to act as a safeguard to the radiator should the fan become bent or out of line and strike the radiator. In the latter type of rim fans it appears that the intention is to reduce noise.

The writer has conducted air delivery tests extensively on both types of fans and has found them very inefficient.

Flat-Blade Fans Common

Flat-blade fans are the most common in use at the present day. They are usually of the four-blade type built up on a central spider. Their air delivering qualities are not good at low speeds, say, at a peripheral speed less than 5000 f.p.m.; consequently they have to be run at very high speeds. High speed fans are noisy and consume a large amount of power. These two factors will be discussed later in this paper. It is safe to say that the flat-blade fans are very efficient when working at peripheral speeds in excess of 15,000 f.p.m., which, for 16 in. and 18 in. fans, is close to 3000 r.p.m.

Curved-blade fans, as class, are similar in their construction to flat-blade fans; that is to say, they are normally built up on a central spider and are of three or four-blade design, generally. In capacity and efficiency they are much ahead of the flat blade and rim fans. Of course, they do not show a constantly increasing efficiency at very high speeds, 4000 and 5000 r.p.m., but then good engineering practice would counsel against the use of any such fan speeds where it were possible at all to get away from it. These fans are good because their efficient speeds are generally comparatively low and they handle a considerable volume of air.

Of the multiblade type of fan there is only one such make at present in existence. This consists of groups of blades placed one behind the other and presenting somewhat the appearance of two fans upon a single hub. Experiment has demonstrated that this is far and away the most powerful and efficient type of disk fan yet produced. The capacity is from 50 percent to 100 percent greater than that of other types and its most efficient speed is down

around 800 to 1200 r.p.m. for 16 in. to 20 in. diameters. It develops a high velocity pressure which drags air through the radiator even under adverse conditions. Its power consumption per cubic foot of air is at least 40 percent less than that of any other type of automobile fan it has been the writer's experience to test. It also has another quality that recommends itself to the automobile engineer—namely, it develops a high peripheral suction around an area about one-third its diameter. It will therefore be noted that it is decidedly centripetal and not centrifugal. This quality brings the edges and corners of a radiator into use. The advantages of this feature are self-evident.

NEW PLANT FOR DIAMOND T

Chicago, April 27—The new plant of the Diamond T Motor Car Co. is just being completed. The old plant has been operated day and night in an attempt to catch up with orders. The first buildings of the new factory cover only about 125,000 sq. ft. of the 10 acres controlled by the company. They are arranged so that stock rooms about 400 ft. long have openings to the loading platform every few feet, and service switches give freight facility.

The capital stock has been increased to \$500,000. The sales force has been reorganized with F. J. Pardee at the head. J. S. Conroy has been appointed district sales manager. J. P. Burris, who has just resigned from the Packard Motor Car Co., will take charge of all national business for the company.

HYDRAULIC TRANSMISSION CAR

Chicago, April 27—A new concern, known as the Oak Mfg. Co., has been organized in Chicago to manufacture a six-cylinder passenger car, which is featured by a hydraulic transmission and a rotary-sleeve engine of the Argyl type. The offices are located at present at 108 South La Salle street. According to S. O. D'Orlow, designer, the new car will sell at about \$1,560.

FRANCE FEELS FUEL SHORTAGE

Chicago, April 29—According to a cable received by the Chicago Daily News, strict measures are being taken by the French minister of supplies, M. Violette, to conserve the use of gasoline. Only 8 gals. a week are allowed for motor cars which do not come under the category of public interest, such as taxicabs, ambulances, etc. These cars are allowed 14 gals.

It is not considered likely that the decree prohibiting touring will be recalled. A pass is necessary for a motor car to go beyond the gates of Paris and absolutely no pass is granted to cross the frontier of the department of Seine and Oise.

These restrictions are not in favor with owners of passenger cars, who see no reason for restriction if they use only their allotment of gasoline. Commercial travelers who had been obliged to rely on transportation via motor are the greatest sufferers on account of the reduction and suppression of train service.

Since many motors are so geared that the fans at times are supposed to be making as much as 4500 r.p.m., the consumption, theoretically, gets up to 6 or 8 hp. It is the writer's basic contention that such a power expended on driving a fan is so completely wrong that its practice should be discontinued without delay. Motors running up steep hills or through heavy roads are frequently shifted into low gear in order to let the cylinders do the work possible at high piston speed. Under such circumstances, then, the fan is demanding one-sixth to one-eighth of the motor's power. These 6 to 8 hp. generate their quota of heat, which again has to be extracted. It is a good fan which will assume this additional burden without allowing boiling.

In looking at the situation from a practical standpoint we must investigate the medium through which this high power reaches the fan. This transmission is usually through a belt, either flat or V. Can a leather or canvas belt, whose contact width is between $\frac{3}{4}$ in. and $1\frac{1}{4}$ in. transmit much over 3 hp. The best authorities on the subject say it cannot be done.

The summary of the whole situation then is that, when the motor gets beyond a certain speed limit, such that the fan should begin to make from 4000 r.p.m. up, the belt begins to slip and once this condition has set in the fan becomes worse than useless for that particular set of conditions. A slipping belt does itself a lot of harm in addition to polishing the fan pulley so as to make the percentage of slip at normal speeds greater.

Noise at High Speed

The reason for going into this branch of the subject so extensively is because there are several hundred thousand cars built annually in which fans are so connected as to develop a speed of from 2000 to 2500 r.p.m. when the car speed is 20 m.p.h. over the ground. These cars, most of them, do not show a heating tendency over smooth roads at that speed, but do when making from 30 to 40 m.p.h. or when the motor is doing the same amount of work in one of the low gears. Then, at just the right time when the cooling agents are most in demand, the fan is either slipping or using an amount of power not at all commensurate with its cooling power.

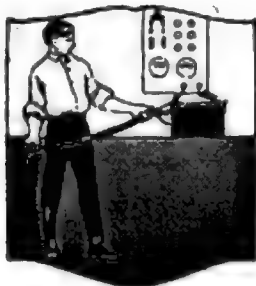
Following immediately in the trail of power consumption at high speeds comes the objection to the noise made at those same speeds. In fan practice both in the ventilating trade and in the automobile trade, it has been pretty well proved that all fans become noisy when their tip speeds exceed 6000 f.p.m. At any speed beyond that point there is bound to be noise, and to a more or less marked degree and the noise increases with the speed.

When a car is racing at 35 or 45 m.p.h. the parties driving are too busy to notice the objectionable noises, but when the same car rolls down a smooth city boulevard at 20 m.p.h. and all of the other mechanisms are practically noiseless, it is somewhat incongruous to have a little 2 or 3-lb. fan making all the fuss.

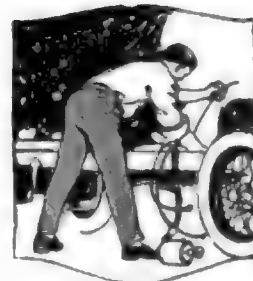
The demand on the part of engineers who build our standard cars is daily becoming more insistent for less noise from the direction of the fan. The only way for this demand to be met is to bring the fan speeds down to somewhere within reasonable limits, and thus cause improvements in several directions, some of which are mentioned further on.

The apparent obstacles in the way of a successful meeting of this demand is the fact that, generally speaking, fans in use today will not deliver much air until they are buzzing at tip speeds around 10,000 f.p.m.

Another objection to high speeds is the effect on the bearings. To the manufacturer of good ball and roller bearings, the mention of 3000 or 4000 r.p.m. carries no terrors. Still, conditions on an automobile that travels all kinds of roads are very different from and much more severe than conditions that obtain on a stationary machine operating in a dustproof housing in some building.



Electrical Equipment of the Motor Car



By David Penn Moreton & Darwin & Hatch.

Editor's Note—Herewith is presented the forty-first installment of a weekly series of articles begun in MOTOR AGE issue of June 29 designed to give the motorist the knowledge necessary to enable him to care for and repair any and all of the electrical features of his car, no matter what make or model it may be. At the conclusion of this series, "Electrical Equipment of the Motor Car," with additions, will be published in book form by the Class Journal Co., Chicago, in a size to fit the pocket conveniently.

The fundamentals of electrical circuits of the motor car were explained through their analogy to water systems, and the relations of current pressure and resistance were brought out. This was followed by an explanation of series and multiple circuits, how electricity is made to do work in lighting, starting, signalling, etc. Calculating the capacity of a battery for starting and lighting and the cost of charging storage batteries and determining the torque a starting motor must develop were explained. Action of primary batteries and dry cells was considered. A section was devoted to the makeup and action of lead and Edison storage batteries, and another to the care of lead batteries in service and the best methods of charging them. Magnets and electromagnetism then were considered, and the principles of generators and motors explained.

Part XLI—Combining Starting, Lighting and Ignition

THE generator and motor are combined in a single unit in a number of different ways. Instead of having two separate machines, they may be combined in the same frame, but each have a distinct field and armature of its own. An example of a combination of motor and generator in the same frame is shown in Fig. 238. In reality this combination is in itself a two-unit system, as the generator and motor actions are entirely independent of each other. The type of construction shown in Fig. 238 is called the double-deck arrangement.

Another method of combining the generator and motor actions is to provide two separate windings on the armature of the same machine, one winding being the generator winding and the other the motor winding. This combination of motor and generator in a single machine is called a dynamotor—sometimes, motor-generator. Each of the armature windings is provided with a separate commutator and brushes. A machine of this kind is shown diagrammatically in Fig. 239, both commutators in this

particular case being on the same end of the armature. When operating as a motor the machines usually drive through a gear on the flywheel, intermediate gear, or by silent chain to the crankshaft. When operating as a generator, the machine is usually driven by the timing gears or by means of a silent chain.

Single-Unit System

Single-unit, or unit, systems are those in which the starting, lighting and ignition are all taken care of by the same machine. This consists of a dynamotor which has a contact breaker, induction coil and distributor fitted to its generator end. A complete system of this kind is shown diagrammatically in Fig. 240.

General Classification of Systems

There are three general systems employed for wiring a car, as follows: The single wire or grounded return, the two-wire, and the three-wire system, respectively.

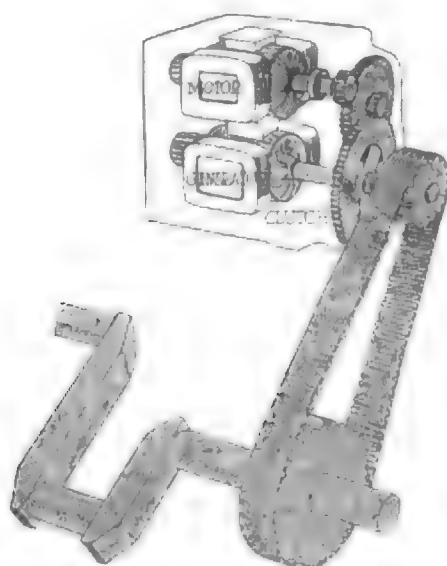


Fig. 238—Double-deck arrangement of motor and generator in same frame

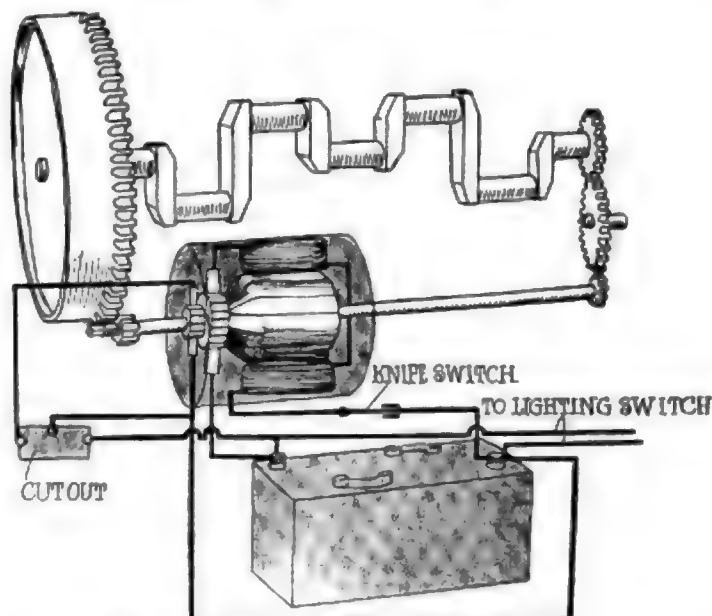


Fig. 239—Application of a dynamotor in a two-unit system. It has two separate windings

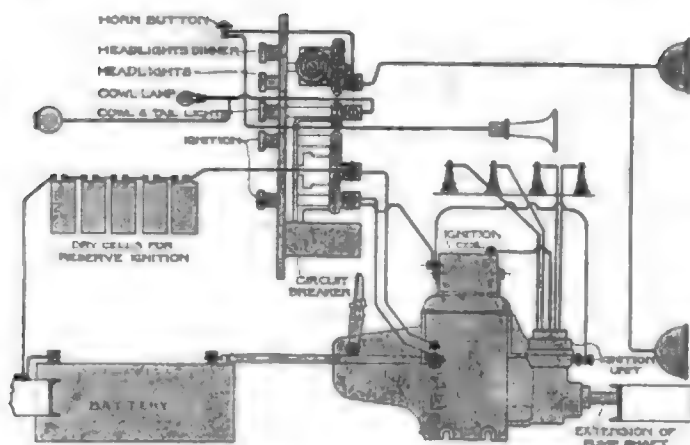


Fig. 240—Typical single, or one-unit, system

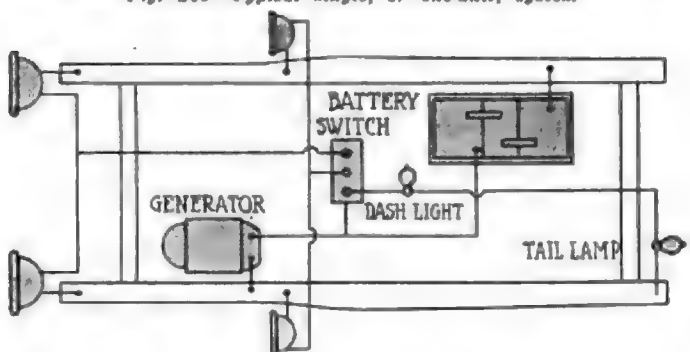


Fig. 241—Single wire, or ground return, system

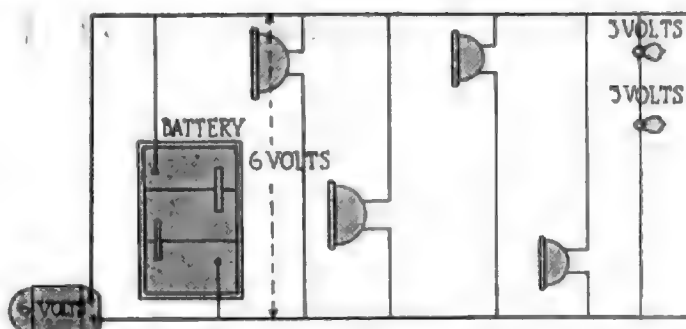


Fig. 243—Two-wire system. Both sides of the circuit are insulated from the frame of the car

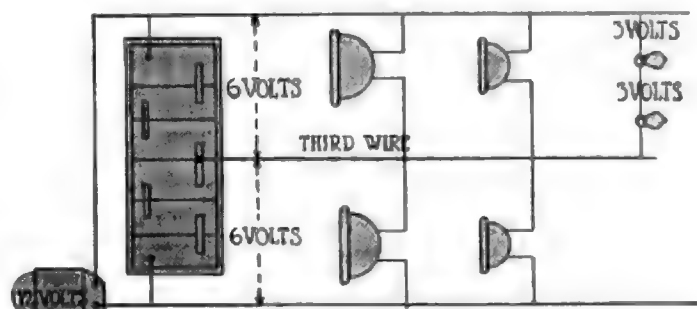


Fig. 244—Three-wire system, one of which wire is known as the neutral

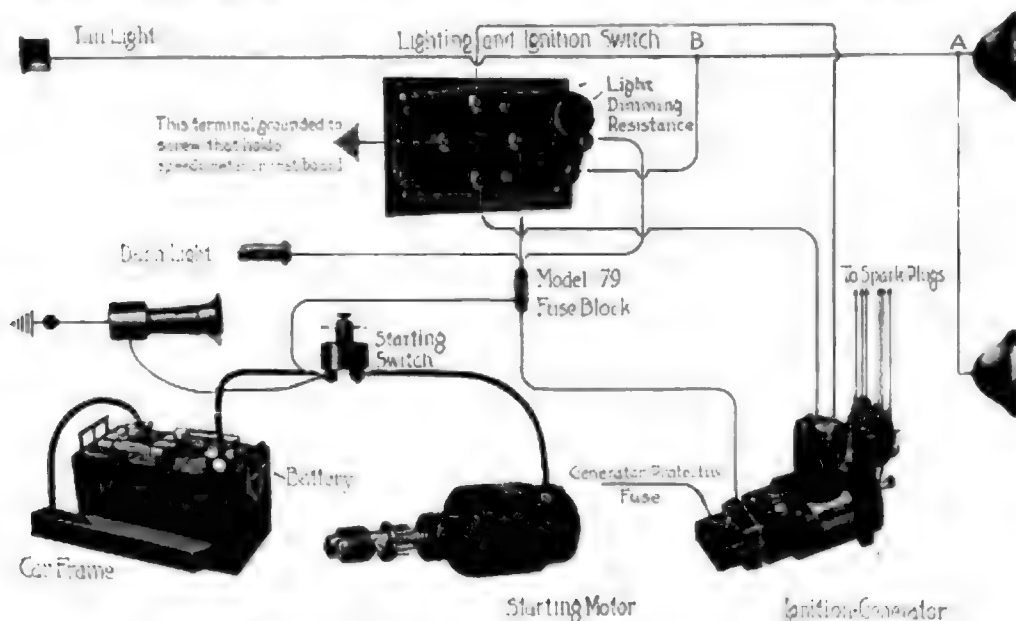


Fig. 242—Remy single wire, or ground return, system as applied to an Oakland 32

In the single-wire or grounded return system the various electrical circuits are completed by using the frame of the car as a part of the circuit, as shown diagrammatically in Fig. 241. A pictorial diagram of an actual installation of this kind is shown in Fig. 242. This is a Remy installation on an Oakland Model 32 car. Great care should be exercised in making the electrical connection to the frame of the car to see that it is as perfect as possible, and not likely to work loose or be affected by corrosion due to moisture or acid fumes. In some systems the positive terminal of the battery is grounded, while in others it is the negative terminal, no uniform practice being followed in this respect.

In the two-wire system both sides of the electrical circuit are insulated from the frame of the car, and the electrical circuits

are completed by conductors specially provided for this purpose. Such a system is shown diagrammatically in Fig. 243.

The three-wire system consists of three wires, one known as the neutral, and arranged as shown diagrammatically in Fig. 244. The middle, or neutral, wire divides the battery into two parts, and the lamps and other electrical equipment may be connected between either of the outside wires and the neutral or between the outside wires. When the lamps are connected as shown in Fig. 244, if the fuse blows on one side the lamps on the other side still remain lighted. A good example of an installation of this kind is found in certain types of the U. S. L. systems. In these installations the connections of the starting switch are such that the two sections of the battery are in parallel when operating the starting motor and in series the remainder of the time.

The Readers' Clearing House

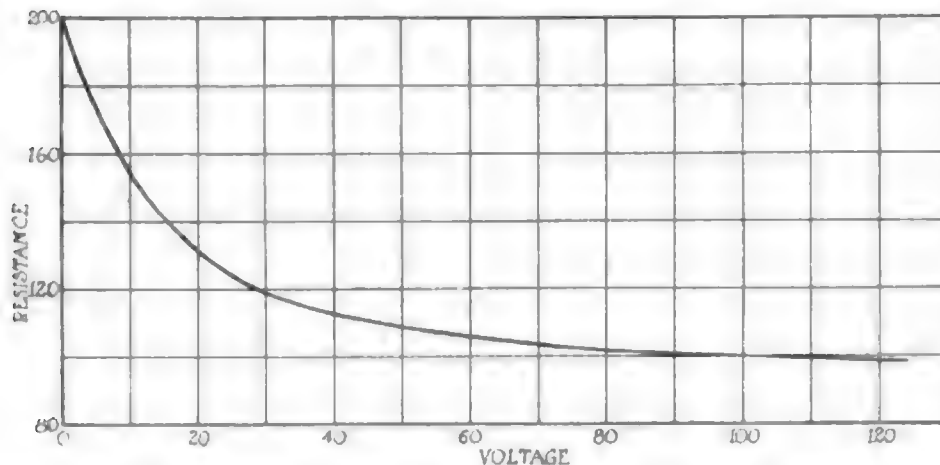


Fig. 1—Curve showing relation of resistance to voltage in problem presented by H. A. Noa

LAMP RESISTANCE IN 110-V. LINE Assume That Current Is Direct Instead of Alternating

STRAW PLAINS, Tenn.—Editor *MOTOR AGE*—How many 32 c.p. carbon lamps would have to be used in connection with a 110-volt circuit to charge a 12-volt battery? The battery is marked 3-12 a cap 5 amps. for 8.4 hrs. Amperes charge rate—start 7, finish 2. How long will it take to charge?—H. A. Noa.

We assume that the 110-volt circuit is direct current as it would be impossible to use it in charging a storage battery if it was alternating current unless some kind of a rectifier be used to change it to direct current. Assuming that the voltage of each of the cells is 2 volts when they are first put on charge at the rate of 7 amp. then the total voltage of the six cells or the entire battery will be 12 volts. The voltage of the battery opposes the voltage of the circuit to which the battery is connected and it is the difference in their voltages which produces the charging current. This difference in voltage for this particular case is equal to 110 minus 12 or 98 volts when the battery starts to charge. This voltage is to produce a current of 7 amp. through a resistance composed of a number of 32 cp. 110-volt lamps connected in parallel, and the value of this resistance will be equal to 98 divided by 7, which gives 14 ohms.

The resistance of a carbon filament lamp is not the same for all voltages, as a change in voltage causes a change in the current, which results in a change in temperature and this causes a change in the resistance of the lamp, the resistance increasing with a decrease in voltage. The relation between resistance and voltage for a 32 cp. 110-volt carbon filament lamp is given in the curve in Fig. 1. Lamps of the same rating will, of course, vary among themselves and the ones you use may differ slightly from the results obtained from the curve. In connecting a number of equal

resistances, such as lamps in parallel, you will get a total resistance which is equal in value to the resistance of one of the lamps divided by the number connected.

We know the resistance of a certain number of 32 cp. connected in parallel is to be 14 ohms when they are operating at 98 volts. The number of lamps required will be equal to the resistance of one lamp at 98 volts, which is equal to 100 ohms as

taken from the curve, divided by the total resistance of the lamps, or 14 ohms, which gives 7.1 as the number of lamps. Of course, a whole number of lamps will have to be used so we will select 7 as the proper number to start with. As the battery continues to charge its voltage will increase and there will be a decrease in current unless the resistance be lowered by adding more lamps. It is good practice to allow the current to decrease in value as the condition of charge of the battery approaches its completion and it may be necessary to increase the resistance by decreasing the number of lamps. The required changes in the resistance of the lamps in order to bring about the proper change in the charging current while the battery is charging will depend upon the change in value of the difference between the line voltage and the voltage of the battery.

The time required to charge a storage battery will depend upon its ampere-hour capacity and the charging rate at which it is charged. Thus, if a battery is capable of delivering 5 amp. for a period of 8 hr., its ampere-hour capacity will be equal to 5 times 8, which gives 40 amp.-hr. A storage battery is not 100 percent efficient; that is, it will not deliver back to a cir-

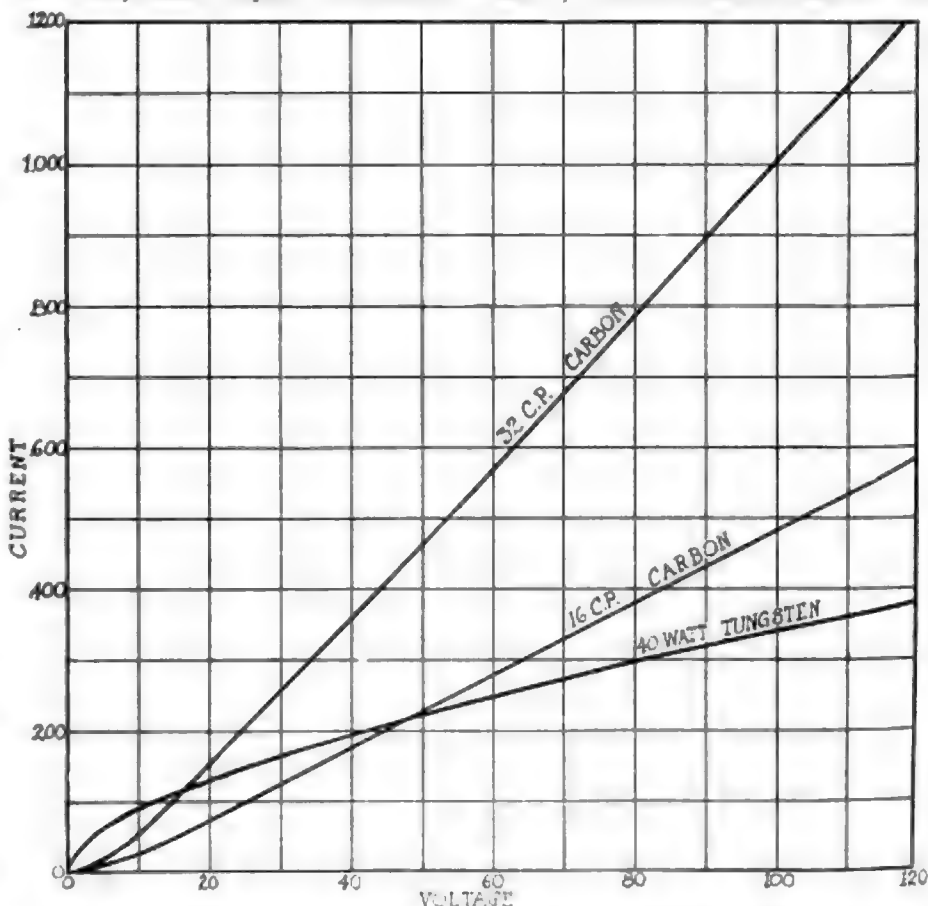


Fig. 2—Showing relation to current and voltage with three types of lamps. This chart is for assistance in answering questions presented by W. H. Kellen

cut all the voltage that is put into the battery.

Assuming an efficiency of 70 percent, then 40 amp.-hr., which is the output, will represent 70 percent of the input or the input will be equal to 58 amp.-hr. If you start to charge at the rate of 7 amp. and end up at a rate of 2 amp. and assuming the charging current decreases quite uniformly during the charging period, then the average charging current will be 4.5 amp. The time required will then be equal to 58 divided by 4.5, which gives a little less than 13 hr.

40-VOLT DYNAMO—6-VOLT BATTERY How to Step Down Voltage by Putting Lamps in Circuit

Beloit, Kan.—Editor MOTOR AGE—I have a 40-volt dynamo which is used for charging a 32-volt lighting system. I want to charge 6-volt storage batteries with it. Can I reduce the voltage by using lamps in series? Show by diagram the proper method of connecting. —D. M. Van Pelt.

The proper method of connecting your 6-volt storage battery to a 40-volt circuit is shown in Fig. 3. A number of lamps may be connected in parallel by mounting several porcelain lamp sockets on a board and connecting the terminals of these sockets to two binding posts B1 and B2 as shown in the figure. An ammeter is shown connected in series which will enable you to determine the value of the charging. The current in the circuit will depend upon the voltage at the source or switch which has in this case been assumed as 40 volts, the counter voltage or pressure of the battery and the resistance of the entire circuit.

The difference between the 40 volts and 7.5 volts, which would correspond to about the voltage of the battery when it is on charge, is 32.5 volts. This voltage is to be used in producing the charging current and must overcome the resistance of the circuit. The resistance of the wires and the internal resistance of the battery is quite small in comparison to the resistance of the lamps, hence we may assume the lamps constitute practically the entire resistance.

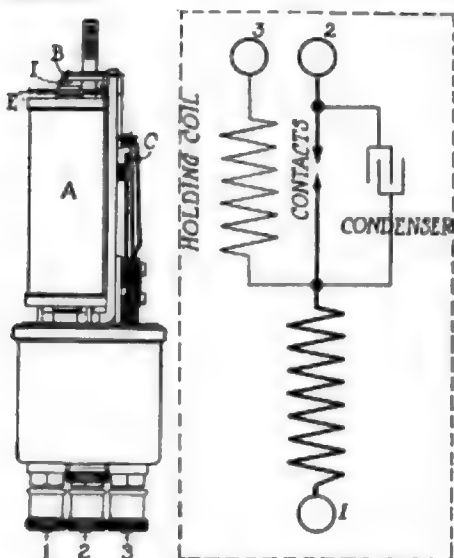


Fig. 5—The Hudson 1913 ignition relay and its internal wiring

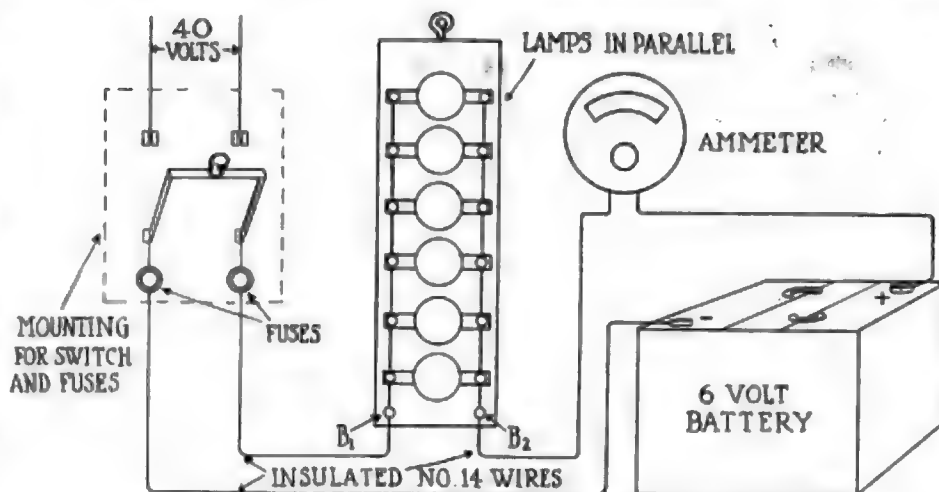


Fig. 3—Layout for charging 6-volt battery from 40-volt direct-current circuit

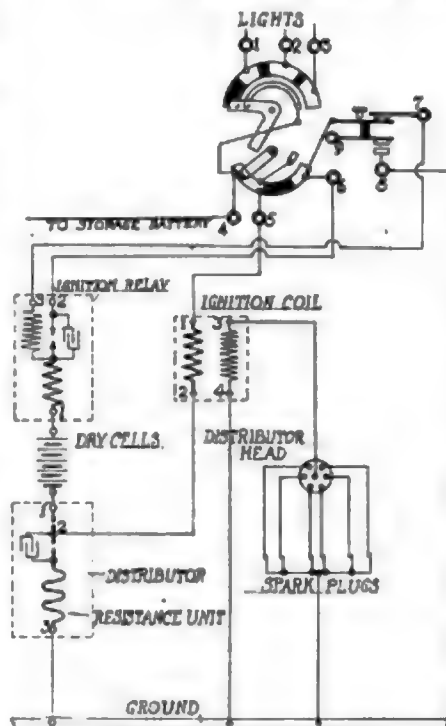


Fig. 4—Layout of Delco system on 1918 Hudson to explain operation of ignition relay

Assuming a charging current of 5 amp. then the resistance will be equal to 32.5 divided by 5 or 6.5 ohms. This represents the resistance between the terminals B1 and B2 and it may be adjusted to approximately this value by carrying the number of lamps. The more lamps that are connected the less the resistance between B1 and B2 and likewise the fewer the number of lamps the higher the resistance.

The resistance of lamps of a certain voltage rating will depend upon the kind of filament they have, whether it is carbon, tungsten, etc., their rated candle power, and the voltage at which they are actually operated. High candle power carbon-filament lamps will offer less resistance than any of the others and for this reason a smaller number of this kind will be required than if some other kind, such as tungsten be used. If two or more batteries be charged at the same time by con-

necting them in series, then the resistance of the circuit must be lowered, in order to maintain the charging current, which may be done by increasing the number of lamps. A little experience will enable you to make these adjustments quite easily.

DETERMINING CHARGE RESISTANCE Lamps Necessary for Various Numbers of Batteries

Cecilia, Ky.—Editor MOTOR AGE—I am installing a charging system, using 110-volt D. C., taken from the lighting system, with carbon-filament lamps for resistance. Is there a fixed rule for determining the exact amount of resistance to use when charging one, two or more batteries, or, in other words, the exact number of lamps, say, 32 c.p.

I have been told that one 32 c.p. carbon-filament lamp will allow one ampere to pass through the battery, using six 32 c.p. lamps, would allow six amperes to flow through the battery. If same be true a 6-volt, 60 ampere hour battery would require six such lamps to charge at a rate of 6 amps. per hour, or two 6-volt, 60 amp. hour batteries of 6 amps. per hour, and so on.

Is this correct? If not, advise me just how I can determine the amount of resistance?—W. H. Kellen.

Your statement about one 32 cp. carbon filament lamp allowing approximately 1 amp. to pass through it, is quite correct, provided the voltage acting on the lamp is approximately 110 volts. The resistance of the carbon filament of a lamp changes with a change in the value of the current the lamp is carrying. This change in resistance is due to a change in temperature which increases with an increase in current and decreases with a decrease in current.

The resistance of the filament of a carbon lamp, however, decreases with an increase in temperature and increases with a decrease in temperature. Now the current sent through the lamp will depend upon the voltage applied to the lamps. The relation between current and voltage for several different kinds of lamps is shown in the accompanying figure. It is interesting to note that the current taken by a tungsten lamp at first rises quite rapidly with an increase in voltage, which is just the opposite of the carbon lamp. You must bear in mind that there may be quite a little difference in the current taken by different lamps of the same kind and same rating.

In charging your storage battery, the

voltage over the lamps will be equal to the difference between the line voltage and the combined voltages of the batteries you have on charge. Assuming you have a single three-cell battery on charge and you wish to send a current of 6 amp. through it, the voltage of the battery will be something like 7.5 volts, which leaves 110 minus 7.5 or 102.5 volts for the lamps. The current taken by one 32 cp. lamp at 102.5 volts, as given by the curve, Fig. 2, is 1.03 amperes, and in order to have a current of 6 amp. the number of lamps required will be equal to 6 divided by 1.03, which gives 5.82. It is impossible to use a fractional number of lamps, but a nearer correct value of current may be obtained by using one 32 cp. and ten 16 cp. carbon lamps, which will give a total current of 5.98 amp. at 102.5 volts as taken from the curves.

If five batteries, each having a terminal voltage of 7.5 volts, be on charge, the voltage over the lamps will be equal to 110 minus 37.5, which gives 72.5 volts. In this case at least nine 32 cp. carbon lamps will be required, which will give a current of 6.3 amperes as taken from the curve.

OPERATION OF AN IGNITION RELAY

How Electrical Instrument on 1913 Hudson Works

Fayetteville, Ark.—Editor MOTOR AGE—What is the bore and stroke of the engine on Hudson Model 37, 1913?
2—What is the brake horsepower?
3—Explain how the ignition relay on this model works.—Leland Stoffer.

1—The bore and stroke of the Hudson 37 motor is $4\frac{1}{2}$ by $5\frac{1}{4}$ in.

2—The brake hp. is 42.

3—The ignition relay is connected into the dry battery circuit and serves to interrupt the primary ignition circuit and so produce a high-tension flow in the secondary and establish a spark at the plugs. The relay is connected to the ignition coil and distributor in two ways as illustrated in Figs. 3 and 4.

Refer to Figs. 1 and 2. The relay consists of a set of contacts operated by an electro-magnet having two windings, one of comparatively coarse wire, so connected that the current ceases to flow through it when the contacts C are open, and the other of comparatively fine wire connected to the contacts C in such a way as to hold the armature of the relay open after the circuit in the coarse-wire winding is opened at the contacts C. This coil is known as the holding coil. A condenser is also connected around the contacts C to suppress the arc, and to thus increase the speed with which the arc between these contacts is broken.

The operation of the relay varies with the connection to the external circuit slightly, and this operation will be discussed under the following heads:

See Fig. 3. The contacts C of the relay and the coil A are in series with a special set of timer contacts on the dual distributor. When these contacts are closed,

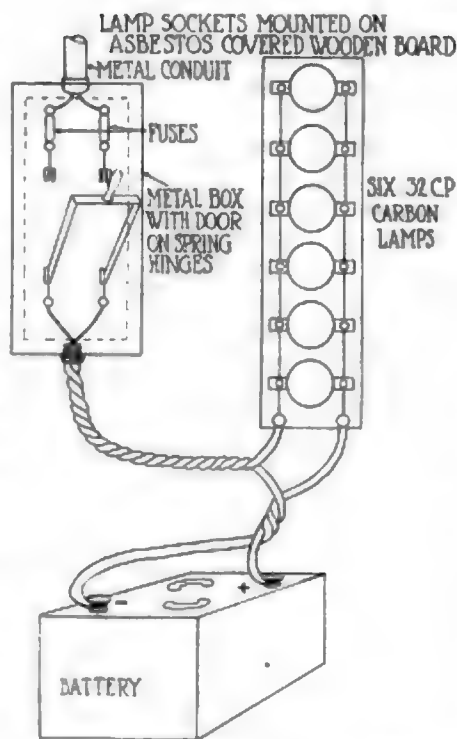


Fig. 6—Charging outfit for 6-volt battery using 110-volt direct-current line

Inquiries Received and Communications Answered

H. A. Noe.....	Straw Plains, Tenn.
D. M. Van Pelt.....	Beloit, Kans.
W. H. Kellen.....	Cecilia, Ky.
Leland Stoffer.....	Fayetteville, Ky.
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Ed Brooks.....	Beloit, Wis.
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A. Reader.....	Newman, Ill.
Almon Berg.....	Lenox, Mont.

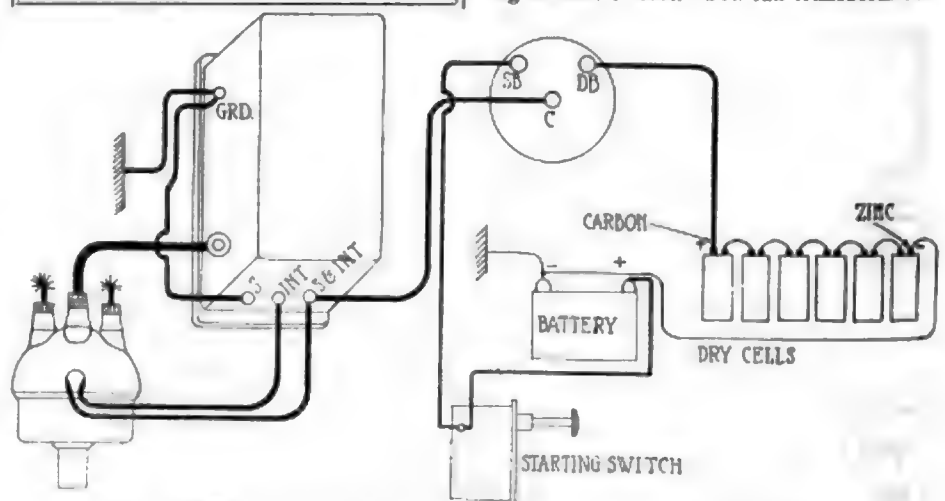


Fig. 7—Wiring diagram of Atwater Kent system as used on 1915 Regal

by the revolving of the fibre timing cam, current passes through the ignition coil and the timer contacts and contacts C of the relay and through coil A, energizing the latter.

This immediately causes the armature to open, thus interrupting the primary circuit and causing a spark at the spark plug. As soon as the circuit is interrupted, coil A is de-energized, and contacts C open again and this is repeated indefinitely, giving a vibrating spark all the time that the timer contacts are together.

This occurs only, however, when the circuit between the terminals No. 6 and 7 on the combination ignition and lighting switch is open. This is accomplished by pressing the starting button.

Now, if it is desired to get just a single spark, the holding coil is energized, and when the armature touches the core, it will be held there, so that a single spark similar to that furnished by generator or storage-battery ignition will be obtained.

This coil is energized when the circuit between terminals No. 6 and 7 on the combination ignition and lighting switch is closed. This is done by releasing the starting button.

HOW TO MAKE CHARGING OUTFIT

Illustration and Description of Direct-current Device

Pleasant Hill, Ill.—Editor MOTOR AGE—How can I rig up a charging outfit to charge a 6-volt storage battery from a 110-volt city lighting system. I want an inexpensive system to charge my own battery. I have a small transformer that stops a 110-volt system from 0 to 27 volts. Can I use it? If so, publish a sketch. I understand such an outfit can be rigged up by using several lamps wired in series, but I don't know how to connect it.—A. I. Roberts.

You failed to state definitely the kind of current available; that is, whether it was direct or alternating. If it is alternating current you cannot charge your storage battery without the use of some kind of a rectifier for changing it into direct current. The transformer is for the purpose of transforming from a current of one voltage to the same kind of a current of different voltage. The transformer will work only in connection with an alternating current circuit. You can transform the

ture would be 20 deg. below on starting in the morning, I made the practice of putting in about a quart of 70-test gasoline to a 10-gal. tank, and the engine would start on the first spin if the oil was not thickened so bad that it was difficult to turn the engine over at any rate of speed. In the event of the oil being thickened badly, I would then jack up one rear wheel, and could then throw the engine into high gear and spin it, and thus start easily.

The latter part of March I took the engine out of the car for overhauling. I found very little carbon in the combustion chambers or around the valves—about as much as I had been accustomed to find after driving 600 miles with straight gasoline, and this was not at all hard or crystallized. The carbon on the piston heads was not excessive, nor was it crystallized, but it appeared more like a gumbo, brownish in color and inclined to powder up, and appeared to be a baked accumulation of road dust. The bearings were in fine shape. The two connecting rods were a little loose, but not enough to make noise or do damage. The wrist pins were all right and the main bearings did not need any attention.

I proceeded to clean the carbon, ground the valves, fitted a new set of Ford over-size rings to each piston, tightened up the connecting rods, put in a new set of valve springs, a new commutator complete, am going to use the old commutator shell for a washboard, and called it a job.

Ran Slowly at First

Then I started the engine with the hose pouring a good stream of water through the radiator, keeping it filled all the time and running out of top and bottom, and let the engine run slowly for about an hour or so.

After this I took the machine out on the road and made about 100 miles at not over 20 to 25 m.p.h. on a tank of 37-test kerosene and 57-test gasoline, half and half, by which time new rings were becoming some good. With about 2 gal. of this left in the tank, I pulled up to an oil station and took 6 gal. of 37-test kerosene and a gallon and a half of 83-test gasoline and proceeded to make 120 miles on this mixtures at speeds of from 35 to 45 m.p.h. The rings were then getting in good shape. There was a temperature of about 32 above, a strong northwest wind and a light snow. The machine was running perfectly throughout this entire 120-mile run. The mileage on both fuel and oil was rather poor, however, but speed, hills and new rings had been unfavorable for much of a record in this respect, nor was the weather at all favorable.

I then decided to make a test for the last 75 miles of the trip on straight kerosene, so with a hot engine and into an empty tank, I placed 6 gal. of 37-test kerosene and made these 75 miles over very hilly country on the River to River road in a little less than two hours and with a fuel consumption of only 2 gal. of this fuel. When the car cooled off, I was unable to

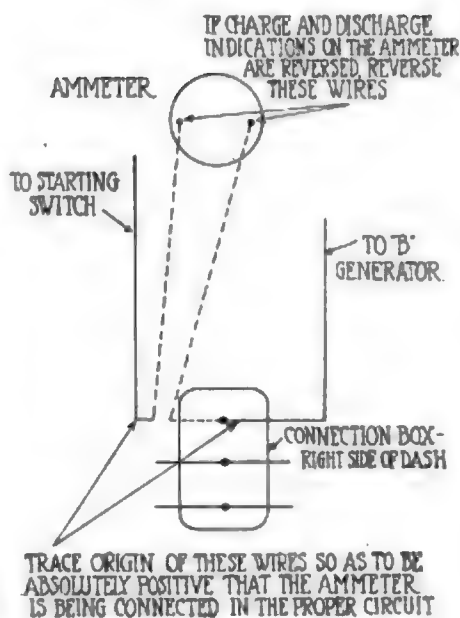


Fig. 10—Diagram to show method of connecting ammeter to Chandler

start it without using hot water on the carburetor.

The radiator used about a quart of water per 100 miles, but had a small hose leak in it. The engine showed no symptoms of heating, in fact, appeared to be at a perfect temperature at all times.

The carburetor used was a plain Holly, and the same adjustments were made from the dash for all conditions of the trip as would be followed for gasoline straight, except that in burning the kerosene straight, I had to give it a very rich mixture for the hills unless I could hit them at sufficient speed to maintain at least 25 or 30 m.p.h. to their summit. The car is a stock job in every respect.

The conclusions which I have reached from this kerosene route are:

That to burn kerosene, good compression is imperative; ignition and other conditions normal. Any modern carburetor will handle straight kerosene at speeds above 25 m.p.h. as well as gasoline, and that hot water on a manifold or carburetor will en-

able car to be started. But for temperatures above 85 deg. a mixture of five parts 37-test kerosene and one part high-test gasoline, 70 or higher if you can get it, will give astonishingly good results on both power and speed. I would rather have it for a trip than straight gasoline of any test. The kerosene has more power, gives a quicker explosion and is much hotter while the small percentage of high test gasoline, like ether, rolls up the kerosene as the rush of air through the carburetor scoops them both up and on into the cylinders.

Until we can get a device that will either heat clear kerosene and hold it at a uniform temperature so that it will evaporate like high-grade gasoline—or better still, a device which will atomize it into the combustion chamber at the proper moment, it will not be found very satisfactory except where high speed can be maintained.—F. A. Parker.

Elgin Engine Test

Farnhamville, Ia.—Editor MOTOR AGE—Is the Falls engine used in the 1917 Elgin six a high-speed engine?

2—At what speed does it reach the height of its power curve; also what power does it show at this speed?—Charles Mahe.

1—It is considered to be a high-speed engine.

2—It has a bore of 3 in. and a stroke of 4½ in., and a dynamometer reading taken some months ago indicates that the engine develops 35 hp. at a speed of 2500 r.p.m.

To Get Grease Off of Paint

Evansville, Ind.—Editor MOTOR AGE—In re-varnishing my car, how can I remove the grease accumulated on the gearbox and differential housing without injuring the paint?

2—Can a cylinder be lined with aluminum so that when an aluminum piston is used you can overcome the difficulty caused by using a soft-metal piston against a cast-iron cylinder.—A Reader.

1—By the use of a varnish cleaner. There are a great many to be found on the market. A steam jet will also remove the grease without harming the paint.

2—No. There is no difficulty coming from using aluminum against cast iron as far as bearing effect is concerned. The

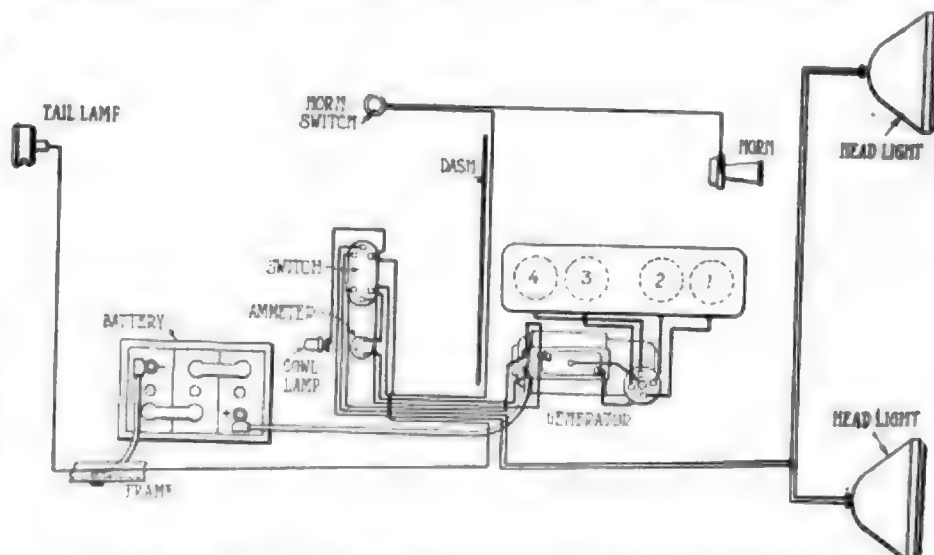


Fig. 11—Diagram to show method of connecting ammeter on 1917 Buick four

only real difficulty found in the use of the two metals in this manner is that the coefficient of expansion of the two is different. Aluminum expands more than cast iron with the same amount of heat. The result is that the aluminum pistons must be given greater clearance than would be necessary with cast-iron pistons. A lining of aluminum in the cylinder would not remedy this trouble and, furthermore, aluminum against cast iron is a better bearing medium than aluminum against aluminum.

Charging Rate in Cadillac

Milwaukee, Wis.—Editor *MOTOR AGE*—At what rate is the generator in a 1914 Cadillac supposed to charge, running at a speed of about 18 m.p.h.?—A. O. Ohrmund.

The charging rate depends upon the condition of the battery. If the battery is low the charging rate may be from 25 to 30 amp. If the battery is nearly fully charged the charging rate may not be over, say 5 amp. You will thus see that the charging rate does not depend upon the speed of the car but rather upon the condition of the battery.

Connecting Two-Wire Horn

Berwick, N. D.—Editor *MOTOR AGE*—My 1917 Grant six has only one wire for the present horn, and I would like to know how I can connect a horn requiring two wires.—H. W. Arnold.

Connect one terminal of the two-wire horn to the wire leading from the battery and connect the other terminal by a short wire either to some metallic part of the body or to the frame, just so there is a ground return through the frame to the battery. If the horn does not blow, reverse the wiring on the horn.

Date Ford Engine Was Made

Corinth, N. Y.—Editor *MOTOR AGE*—On a Model T Ford engine No. 77,117 what is year of manufacture?

2—I am converting the Ford into a truck. What percent of power will be lost by the magnets if left as when new?

3—I have an Atwater Kent system, so that the magneto simply furnishes lights which I will seldom need. Would you advise replacing the old carburetor with kerosene type?

I have used an Air Friction on a large car for several years using a mixture of 1 gas to 3 kerosene with good results.—C. L. Scott.

1—Engine No. 77,117 was manufactured under date of Oct. 6, 1911.

2—The power loss caused by the magnets

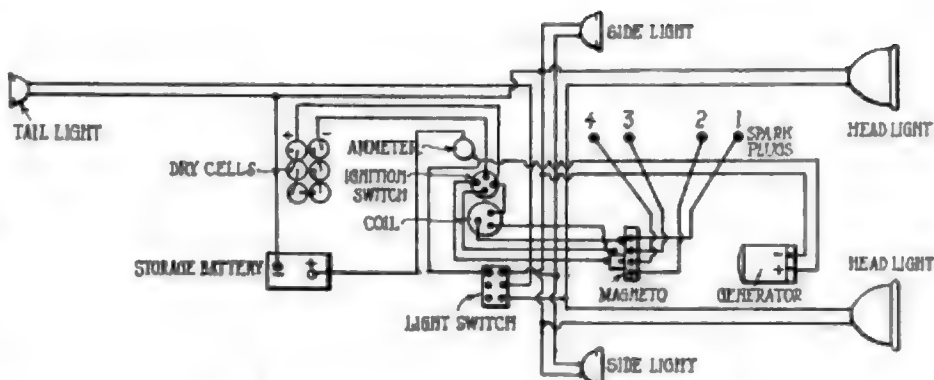


Fig. 13—Rushmore Bosch system as used on Regal

of the Ford magneto has never been computed as far as we know.

3—For trucking purposes a kerosene system should be satisfactory. Before buying the kerosene burner, however, make sure by demonstration or other proof that it will handle this low-grade fuel efficiently.

Hudson's Average Speeds

Champaign, Ill.—Editor *MOTOR AGE*—Advise average speeds made by the Hudson super six in the speedway races of last season.

2—How many six-cylinder cars will be in the 1917 racing lineup?

3—How do the number of sixteen-valve four-cylinder engines used compare with all other types of racing engines?

4—Is the Packard Co. going to bring out a racing team this season?—R. E. Lindsey.

1—The highest speed obtained was 104 m.p.h. and the general average was 93 m.p.h.

2—Due to the fact that so many of the large races have been called off because of the war, it is rather a quandary what cars will be seen this year.

3—The Stutz and Duesenberg racers were the only ones campaigned extensively which used sixteen-valve engines.

4—No.

Hudson Power at Various Speeds

Kansas City, Mo.—Editor *MOTOR AGE*—What is the horsepower developed by the Hudson Super-Six engine at 500, 1200, 1400, 1500, 1800 and 1900 r.p.m.

2—Can you remove the pistons and connecting rods by dropping the crank case on this engine?—J. W. Clower.

1—The horsepower developed by the Hudson Super-six engine at 500 r.p.m. is 15; 1200 r.p.m., 42; 1400 r.p.m., 50; 1500 r.p.m., 55; 1800 r.p.m., 65; 1900 r.p.m., 68.

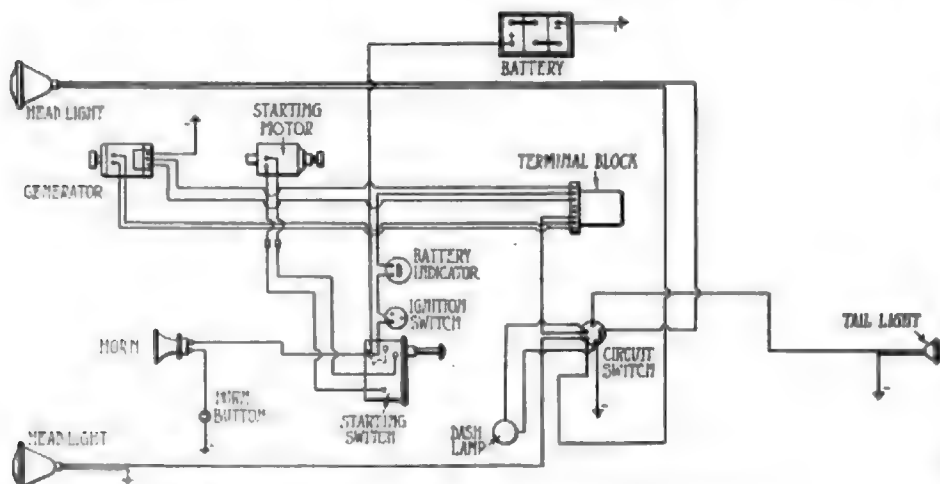


Fig. 12—Wiring of Auto-Lite system on model K Abbot-Detroit

2—Regarding the removal of pistons and connecting rods without taking the head off, only Nos. 3 and 4 can be removed this way.

Disbrow Specifications

Seattle, Wash.—Editor *MOTOR AGE*—What is the bore and stroke of the Disbrow semi-racing cars?

2—The piston displacement?

3—What is the brake h.p. of this engine?

4—What is the speed?

5—What is the gear ratio?—Bob Masumoto.

1—Model A, 5.1 by 5.5; model B, 5.25 by 7; model C, 3.75 by 5.5.

2—Model A, 449 cu. in., model B, 567 cu. in., model C, 243.

3—There are no brake horsepower figures available.

4—According to the makers the speeds of the three models are as follows: Model A, 87 m.p.h.; model B, 95 m.p.h.; model C, 90 m.p.h.

5—2½ to 1.

Highest Hudson Speed

Alton, Ill.—Editor *MOTOR AGE*—What is the highest speed any Hudson has attained?—Claron Meldrum.

The highest officially recorded speed of a stock Super-Six car is 102.5 m.p.h., or covering a distance of one mile in 35.11 seconds. This car was driven by Ralph K. Mulford on April 10, 1916, under the direction of the A.A.A.

Ammeter on 1917 Buick

Newman, Ill.—Editor *MOTOR AGE*—Illustrate method of connecting an ammeter on a 1917 Buick Four.—A Reader.

A wiring diagram of the 1917 Buick four showing method of connecting an ammeter is shown in Fig. 11.

1917 Chandler Wiring

Tupelo, Miss.—Editor *MOTOR AGE*—Give a diagram showing how an ammeter may be installed on a Chandler, 1917 model. Also, what is the best kind to use on this car?—H. C. McNutt.

A diagram showing the proper method of connecting an ammeter to this car is shown in Fig. 10. Any two-terminal ammeter is suitable for use on this model.

Overland Daily Output

Lennys, Mont.—Editor *MOTOR AGE*—What is the daily output of the Overland?

2—Publish wiring diagram of Auto-Lite system used on 1916 Model E. Abbot Detroit.—Almon Berg.

1—The total 1916 output was 142,771 cars or an approximate average of 450 per day, figuring 300 working days.

2—Shown in Fig. 12.



Holley Kerosene Vaporizer for Fords

Motor Age Representative Finds Rapid Acceleration and Good Power in Test

THE Holley kerosene vaporizer is now ready for application to Ford cars in the United States. Already many of the vaporizers have been shipped abroad. A MOTOR AGE representative was given the first opportunity to examine the new instrument and witness its performance on the test block and installed on a Ford car. It will burn kerosene satisfactorily. Gasoline is used as a starting medium only. A dynamometer test of maximum horsepower showed about a 20 per cent falling off over the performance of gasoline, although this is hardly noticeable commercially. It was demonstrated to the MOTOR AGE representative that a Ford car equipped with the vaporizer will idle smoothly at 6 m.p.h. and then accelerate rapidly and without choking upon opening the throttle wide.

Difficulties in kerosene vaporization have been due to the sluggishness of the fuel. It takes considerable more heat to gasify or vaporize kerosene than it does gasoline. Because of the difference in the burning speed of kerosene and gasoline, the former, which is the slower burning fuel, requires less compression to operate satisfactorily. This reduction in compression is accomplished by a low-compression head substituted for the present Ford head.

The vaporizer will burn kerosene, benzol, distillate, gasoline or any hydrocarbon with a final boiling point below 300 deg. The price is \$22, complete.

Referring to the illustration in Fig. 1, showing a section of the instrument, kerosene and gasoline enter separate float chambers through conventional float-valve mechanisms. The shifter valve B determines which fuel shall be used. Which ever ing needle valve W and through a jet at J.

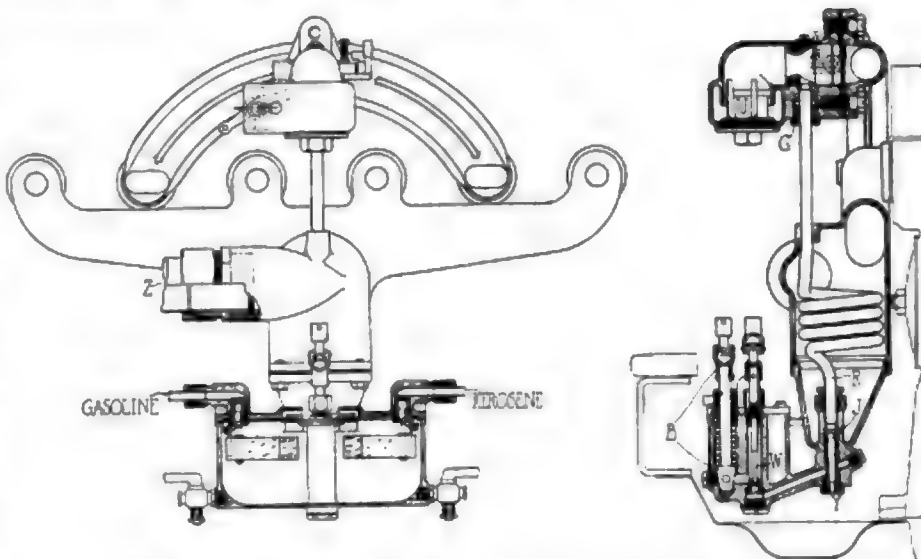


Fig. 1—Sectional views of Holley kerosene vaporizer for use on Ford cars

fuel it may be passes through the adjust. At the top of this jet the fuel is atomized by an air blast which is caused by the suction of the engine. This air enters at point Y. A very small quantity of air is admitted relative to the amount needed for a perfect explosive mixture, and the result is a very rich mixture.

This rich mixture is carried upward through a vaporizing tube B, which is located in the exhaust manifold. This tube is coiled to absorb all possible heat from the exhaust. It is said that the temperature reaches 500 deg. Fahr.

The rich mixture, now highly heated, passes from this coil to the main mixing chamber through the stuffing box G and here additional air is introduced through the air valve U, giving a proper combustible mixture. The suction of the en-

gine governs the opening of the air valve in the mixing chamber and of course when the throttle is opened wider more air is introduced to mix with a higher charge of gas.

As previously stated the compression is reduced by the substitution of a new cylinder head. Actually it is reduced from about 60 lb. per square inch to about 43 lb. per square inch.

In attaching to a standard model T Ford with left-hand drive, the standard gaskets, collars and clamps are retained. The regular exhaust pipe is replaced by a longer one with special bends to attach it to connector Z, using a standard Ford clamp nut for this purpose. The cylinder head is replaced with the new head by means of special long cap screws. The standard gasoline tank makes way for a two-compartment tank to carry the main supply of kerosene and a small amount of gasoline for starting.

There is a dash plate with control rods which is of course special installation. The arrangement of all this equipment is shown in the illustrations.

The engine is started as it would be ordinarily were there a regular gasoline carburetor fitted, with the shifter cock handle pointed to the gasoline position and the primer wire pulled out. After the engine has been run from 1 to 3 min. on gasoline the shifter-cock handle is turned to the kerosene position.

There are only two adjustments. One is the throttle-stop set screw for gaining the proper idling speed and the other is the needle-valve adjustment which is performed in the same manner it is on the gasoline carburetor.

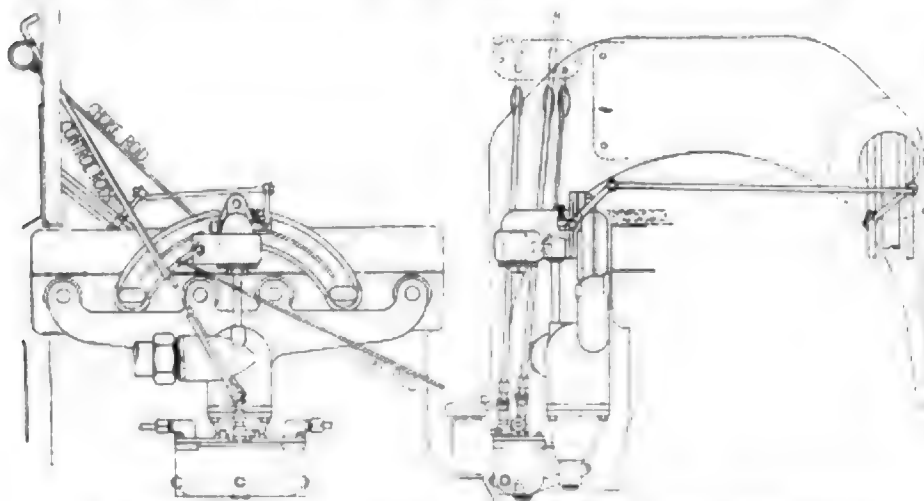


Fig. 2—Showing installation layout of Holley kerosene vaporizer. Control rods for use of either gasoline or kerosene are conveniently located











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ANNOUNCEMENT

The feature of Motor Age for next week will be a story on "Trailing a Trailer Through the Rockies." This article was written by one who last summer was doing this. It shows the possibilities of the trailer under different conditions.

Down the avenue of palms...

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Protest Five Per Cent Tax

Proposed Motor Car Levy Discriminates and Is Too Severe

WASHINGTON, D. C., May 7—The duel between the Ways and Means Committee and the motor car industry on the 5 per cent tax against motor cars to be paid by the manufacturers continues. The Ways and Means Committee is determined to incorporate the 5 per cent tax as a part of the measure, and before this reaches many readers it may be the bill will be reported to the House incorporating this discriminating tax.

The motor car industry, through the National Chamber of Commerce, Inc., has been opposing the measure and Alfred Reeves, the general manager, is spending a good deal of his time in Washington, representing the industry and endeavoring to secure only equitable taxation against the industry. The motor car industry objects to this tax on the ground that it is a discriminating tax and not levied against other industries.

For example: If the motor car and motor truck manufacturers have to pay a 5 per cent tax on the selling price of their vehicles, then why should not the manufacturers of wagons, buggies, trolley cars, railroad passenger cars, railroad freight cars, barges, steamboats, private yachts, etc., pay a similar tax? Why should not the manufacturer of airplanes and any other vehicle

used in transportation pay a similar tax?

This is the information the motor car industry would like. The industry is patriotic to the core. It realizes the country is in war and that \$2,000,000,000 per year must be raised to defray this war cost. The industry must pay its share, and is willing to. The manufacturers of cars, trucks and accessories are willing to pay their equal share of the excess profit tax, which may range from 8 to 15 per cent, the same as in other industries. The leaders of the industry are willing to pay any increased income taxes, personal taxes, etc., but cannot see why so necessary an industry should be called upon to pay an entirely additional tax such as this 5 per cent one which has been drafted by the Ways and Means Committee.

Car Not a Luxury

This committee seems to have decided upon this tax on the ground that the motor car industry is a luxury industry; on the ground that the motor truck industry is not an essential industry but a luxury industry; on the ground that the man buying a motor car, be he a doctor, a salesman or a business man, buys it for luxury purposes and not for necessity. Such a contention is impossible. Unfortunately political Washington gages the industry by the annual statement of the Ford company. The \$59,000,000

profits from Ford last year seems to have turned the heads of some members of this committee. The committee perhaps does not realize that the Ford profits this year may not be one-sixth of this amount. The committee fails to realize that of the 450 motor car manufacturers in the country 12 per cent of them produce 80 per cent of the cars made. Turning these figures around we find that 438 motor car makers produce but 20 per cent of the cars manufactured. Naturally these 438 makers are not so strong financially as the twelve companies that build 80 per cent of the product. It is not fair to base the entire industry on the Ford statement. It is not fair to base the entire industry on the statements of the ten leading companies in the industry. If we do this the 438 others will be taxed too severely.

The National Automobile Chamber of Commerce has submitted to the members of Congress a brief on the industry with the hope of opposing this taxation. The brief in addition to showing that twelve manufacturers produce 80 per cent of the cars shows that a 25 per cent increase for labor and material has been put on the industry. During the last five years over 600 motor car manufacturers have failed financially.

The complete brief follows:

Facts Regarding Motor Car Taxation

TO THE MEMBERS OF CONGRESS:

MOTOR CAR MANUFACTURERS WITHOUT EXCEPTION, DESIRE TO PAY THEIR FULL FAIR PROPORTION OF THE GOVERNMENT'S EXPENSE. They want to be taxed fully and in proportion to all other industries.

They do object to having double taxation imposed upon them, or any form of taxation that may put dozens of them out of business.

THERE ARE 450 MOTOR CAR MAKERS IN THE UNITED STATES OF WHICH TWELVE MAKERS PRODUCE 80 PER CENT AND 438 PRODUCE 20 PERCENT OF THE WHOLE. The twelve have been prosperous while the bulk of the others are able to exist only in good times. The prosperity is due to increasing volume, the reverse occurs when the volume shrinks.

Since war was declared the volume of sales has been seriously affected. This condition continued will change the volume and hence the profits.

TO TAX FURTHER AND INDIVIDUALLY AN INDUSTRY WITH SUCH A CONDITION EXISTING, IS UNFAIR AND UNJUST. Such a tax would have to be absorbed by the maker. Any advance on a declining market would further restrict sales and hence volume.

THIS CONDITION WOULD MOST SERIOUSLY AFFECT THE SMALL AND THE FINANCIALLY WEAK COMPANIES.

THIS INDUSTRY HAS BEEN OBLIGED TO INCREASE ITS COST FOR LABOR 25 PER CENT AND MATERIAL

MORE, as indicated in the appended list. These costs have been overcome to some degree only by the great volume.

These increases were:

	Per Cent
Sheet aluminum	40
Steel castings	30
Bearings	35
Aluminum castings	50
Leather	30
Stampings	75
Sheet steel	65
Tungsten steel	400
Steel tubing	40
Iron castings	35
Forgings	75

THE MOTOR CAR INDUSTRY COMPRISES APPROXIMATELY 450 MANUFACTURERS AND 925 MAKERS OF PARTS AND ACCESSORIES. THERE ARE 25,924 DEALERS AND 23,686 GARAGES THROUGHOUT THE COUNTRY, all depending on the products of the makers of motor cars.

FEW OF THE 450 MANUFACTURERS ARE, WE BELIEVE, AVERAGING TO EXCEED 12 PER CENT PROFIT ON THEIR TURNOVER. THE 5 PER CENT TAX WOULD, THEREFORE, TAKE FIVE-TWELFTHS OF THEIR PROFITS—assuming the tax cannot be passed on to the consumers—which would equal five-twelfths or 41.6 per cent of the profits of the trade as a whole.

It would be the equivalent of a tax of 41.6 per cent on entire net profits.

THE 5 PER CENT TAX CANNOT GENERALLY BE PASSED ON TO THE CONSUMER. It is impossible to advance prices on a falling market. Very few manufacturers after paying this 5 per cent tax would have anything to pay under the excess profits tax. Their profits remaining, if any, would be less than 8 per cent of their investment.

THE OFFICIAL REPORTS SHOW NAMES OF MORE THAN 600 MOTOR CAR MANUFACTURERS THAT HAVE FAILED DURING THE LAST FIVE YEARS.

We believe that not more than one-half of our motor car manufacturers are breaking even. Few are making in excess of 10 per cent on their turn over.

Material costs have gone up and are going up enormously.

Prices have been driven to absolute top notch by high material and labor costs.

Profits are probably not more than three-fourths what they were a year ago.

DURING THE PAST YEAR, EXCLUDING FORD, 80 PER CENT OR FOUR-FIFTHS OF ALL NEW CARS WERE SOLD TO PEOPLE WHO ALREADY OWNED CARS AND TRADED

THEM IN. If the 5 per cent tax is imposed, THESE PEOPLE WILL LARGELY KEEP THEIR OLD CARS INSTEAD OF REPLACING THEM WITH NEW. Manufacturers will suffer seriously in their sales AND THE GOVERNMENT'S PROPOSED REVENUE FROM EXCESS PROFITS TAXATION WILL NOT MATERIALIZE.

THE MOTOR CAR BUSINESS HAS ALREADY SUFFERED CURTAILMENT THROUGH THE DECLARATION OF WAR. Several thousand men have already been released from employment.

People will not freely buy motor cars in war times, or under heavy tax conditions.

Manufacturers have already begun to curtail output, which means manufacturing costs will go up inevitably. Reduction of output does not correspondingly save overhead which, next to material, is the largest element entering into the manufacture of cars and trucks.

We offer our services to supply further information and details regarding the statements made herein.

NATIONAL AUTOMOBILE CHAMBER OF COMMERCE, Inc.
ALFRED REEVES,
General Manager.

GOVERNOR OBJECTS TO TAX

Detroit, May 7—Governor Sleeper has telegraphed to every Michigan member of Congress a request that he protest most vigorously against the proposed 5 per cent tax on motor car purchase prices and has requested Congressman Fordney, a member of the House Ways and Means Committee, to make a minority report. This action followed a conference between the governor and R. E. Olds, president of the Reo Motor Car Co. of Lansing. Mr. Olds stated that a 5 per cent tax on the purchase price was a 40 per cent tax on profit and would mean the closing of many factories and the curtailment of work in many others. He also pointed out that Henry Ford was the only maker in Michigan who would not be hit by the tax. Ford, according to Mr. Olds, has in his contracts for this year a clause which makes all government taxes payable by the agent and not by the maker.

MOTOR MEN RECEIVE COMMISSIONS

Washington, May 5—Henry Souther, past president of the Society of Auto Tire Engineers, and recently consulting engineer, office of the chief signal officer in the War Department, is to be commissioned a major in the aviation corps.

S. D. Waldon, formerly with Packard and Cadillac and for some time active in government aviation work, has been commissioned a captain in the aviation section of the Signal Corps.

W. H. Hutton, formerly Timken-Detroit purchasing agency, has been commissioned a major in the Quartermasters' department, where he probably will have to do with the inspection and purchase of motor trucks. S. P. Wetherill, Jr., administrative and chemical engineer, has been made a major also in the same work.

Others Enter U. S. Service

Lieutenant F. B. Massey, transportation engineer of the United States Motor Truck Co., has been recalled for service by the

government and has reported to the Boston navy yards.

R. Clifford Durant, son of W. C. Durant, president of the Chevrolet Motors Co. and the General Motors Co., has volunteered for service in the aviation branch of the signal corps.

ZIMMERSCHIED AT WASHINGTON

Detroit, May 5—K. W. Zimmerschied, chief metallurgist of the General Motors Co., has been given a furlough by his company and is now in Washington in charge of the new office there conducted by the Society of Automobile Engineers.

TEN MORE PRICE RAISES

New York, May 7—The following list will give the changes to date that have taken place in motor car prices lately. This list does not include those changes that have already been announced in these columns.

MAKER	MODEL		OLD NEW	
			PRICE	PRICE
Mitchell	D-40	2-Pas.	\$1,150	\$1,195
Mitchell	D-40	5-Pas.	1,150	1,195
Stephens	60-65	2-Pas.	1,150	1,250
Stephens	60-65	5-Pas.	1,150	1,250
KisselKar	6-42	5-Pas.	1,700	1,750
KisselKar	6-42	Sedan	2,050	2,100
Louverne	17		1,500	1,650
Stimplex	Chassis		6,000	7,000
Gilde	6-40	5-Pas.	1,250	1,295
Gilde	6-40	Sedan	1,450	1,495
Pullman		2-Pas.	650	910
Malbohm		2-Pas.	695	795

Savannah, Ga., May 5—The Dort Motor Co. has announced an advance of \$30 in the price of the Dort, effective April 25. Another advance is predicted shortly.

New York, May 4—The Autoear Co., Ardmore, Pa., today raised the price of its chassis to \$1,815. The former price was \$1,650. The bodies have gone up approximately 10 per cent in price. This company reduced its list price on the chassis in March, 1915, from \$1,850 to \$1,650.

AVIATION TRAINING CAMPS

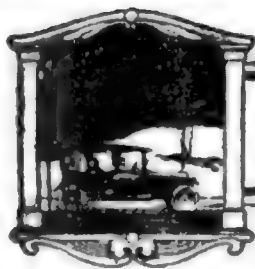
Washington, D. C., May 4—The signal corps of the War Department, on recommendation of the aeronautics division of the Council for National Defense, has selected ten sites for aviation training camps, which number may be increased to twenty. Most of these camps will be opened by July 1.

Plans are being made to send a corps of American aviators to the French front soon. Those assigned for this duty will be drawn principally from the training camps at Mineola, N. Y., Newport News, Va., and San Diego, Cal.

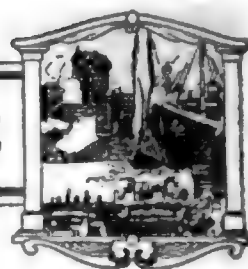
The following institutions have been designated as training schools for army aviators: Cornell, Illinois, Ohio, California and Texas state universities, and the Massachusetts Institute of Technology. The designations were made after a conference between the aeronautics division and college representatives from throughout the country. Aviators will assist faculty instructors. Each of the schools will send three faculty members to study practical aviation problems at the Canadian training school at the University of Toronto. Ohio State University has made arrangements to use a string of ten aviation fields between Columbus and Dayton, which are being established by a Dayton airplane company, the two cities to be terminals of a regular flying course.

3000 AMBULANCES TO FRANCE

Washington, D. C., May 4—The United States will send 3000 ambulances and 7700 doctors and drivers to France, the Council of National Defense announced yesterday. The first unit of twenty-two ambulances and seventy men will leave within three weeks. This is in addition to the six medical units, comprising about 1000 medical men, which will be sent at once to Great Britain.



EDITORIAL PERSPECTIVES



Used Car Problems

THE Milwaukee motor car dealers are to be congratulated on their used car show which demonstrated two or three points with regard to the used car industry. This is progress. It is to be hoped the used car show in Chicago this week will show similar progress. No greater problem confronts the motor car dealer to-day than that of handling the used car situation.

ONE of the important results of the Milwaukee show was that it demonstrated a used car will sell better if repainted and made to look reasonably modern and up-to-date by a few dollars' worth of paint and varnish. At the Milwaukee show cars so renovated were ready sellers as compared with cars not so fixed up.

SEVERAL dealers in our large cities have known for years that a used car if repainted and revarnished will sell better than one not so handled. These dealers generally have had facilities at hand in their own place of business or in the city to

get this repainting done. There are many small towns without such facilities so that the car dealer in a town of 2000 population is handicapped.

ONE respect in which dealers must exercise care in selling used cars is in getting some knowledge of what it costs to handle a used car. The dealer allows \$350 for the car and is content to sell it at the same price, thinking thereby that he has not lost any money. As a matter of fact he has lost \$25 on such a deal. Averages from scores of dealers shows that it costs this amount simply to handle a used car and keep it on hand for perhaps three weeks or a month. The dealer handling the used car should at once count on adding \$25 to the allowed price in order to break even; if he does some repainting and fixing up he should add \$30 more; and if he undertakes to do a little repairing he will have another \$25 to add. Summing up, the dealer handling a used car and making some pretense at repainting and repairing will have to add approximately \$75.

The Five Per Cent Tax

POLITICAL Washington has decided that the motor car is a luxury. They do not consider it a part necessity and a part luxury, but have classed it entirely in the luxury column. For this reason the Ways and Means Committee of the House of Representatives, which is framing a new war taxation bill, has included a 5 per cent tax on all motor cars and motor trucks manufactured. This tax is to be paid by the manufacturer and paid on the selling price of the vehicle to the dealer.

THE motor car industry has been picked out as the victim of such a tax solely because the industry is considered a luxury industry. THERE IS NO TAX ON PULLMAN CARS at the source of manufacture, although THEY ARE A LUXURY in the same sense. THERE IS NO TAX ON TROLLEY CARS at the source of manufacture, although THEY ARE IN THE SAME FIELD WITH MOTOR BUSES. THERE IS NO TAX ON HORSE TRUCKS OR RAILROAD CARS, ALTHOUGH THEY ARE MOVING FREIGHT THE SAME AS MOTOR TRUCKS ARE. THERE IS NO TAX ON STEAMBOATS WHICH CARRY FREIGHT, OR ANY OTHER TYPE OF VEHICLE WHICH CARRIES FREIGHT, EXCEPT THE MOTOR TRUCK.

IT is unfortunate that the motor car and the motor truck should to-day, now that we are in war, be singled out as special targets for what can be looked upon only as DISCRIMINATORY AND CLASS TAXATION. The motor truck is no more a luxury to-day than is the flat car that carries our lumber on the railroads, than is the horse truck, than is the farm tractor, than is the trolley car, than is the lake steamer. All of these are necessary vehicles of transportation, and if ONE SHOULD BE TAXED ALL SHOULD BE TAXED.

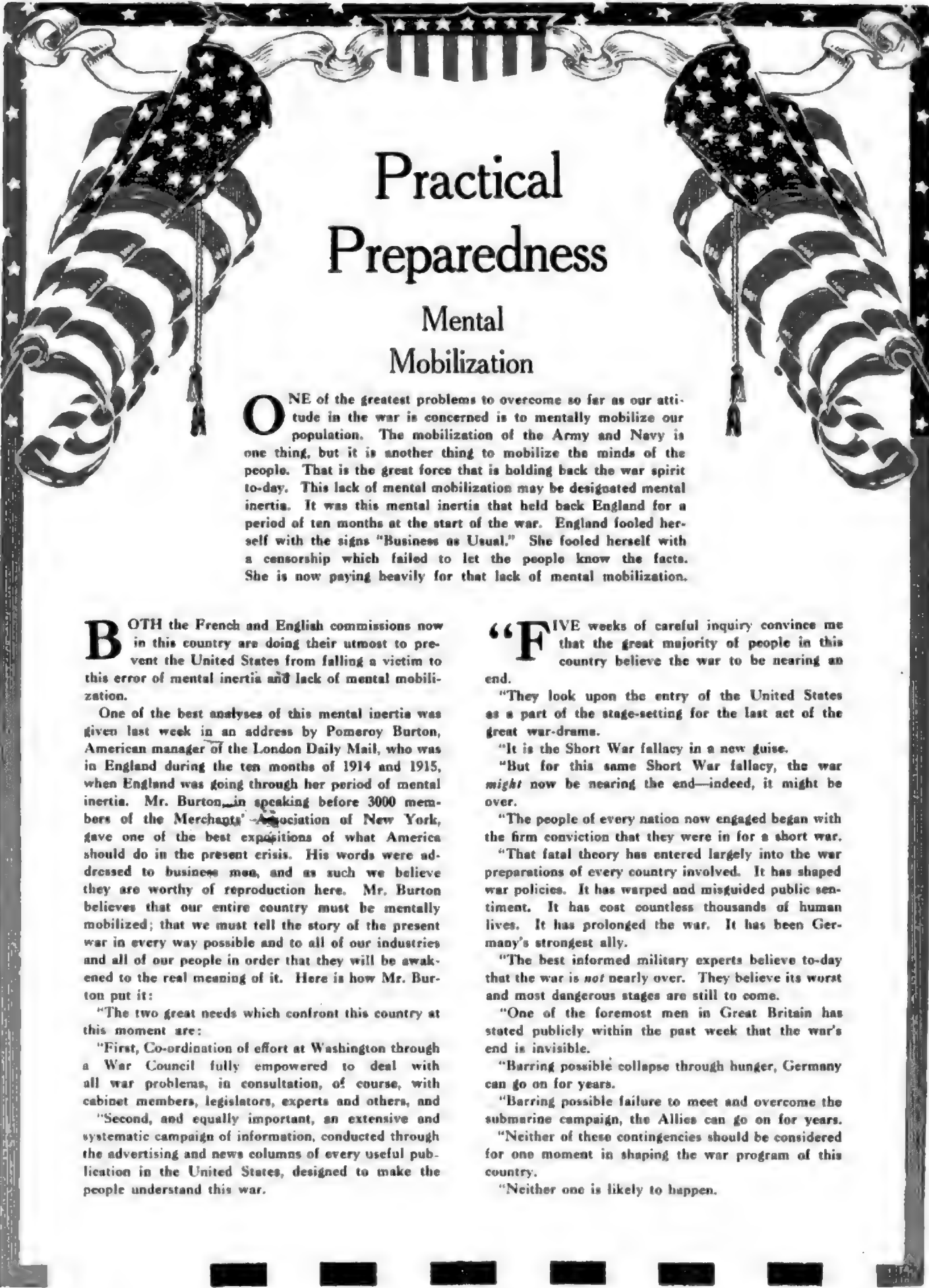
NOTWITHSTANDING the paramountcy of the motor as a vehicle essential in the war of to-day the government through the Ways and Means Committee has made a special onslaught on the industry. It has single out the industry as the one to bear a special burden, A BURDEN NOT LAID ON

OTHER KINDRED INDUSTRIES. The manufacturers in the motor industry, in addition to paying this 5 per cent tax, also will have to pay what is known as the excess profit tax, that is, a tax not definitely settled to-day, but which may be from 8 to 15 per cent of the profits of a concern. In addition to this, the individuals heading motor car companies are paying their income taxes, personal property taxes, etc., and they are all willing and desirous of paying their legitimate share of the war taxation, but they do object to this discriminatory 5 per cent tax placed on an industry which is of paramount importance in the war, when other industries of a similar nature are not asked to bear a similar burden.

EVERY MOTOR AGE reader has a personal interest in combating this 5 per cent tax. You may not be a motor car manufacturer, or you may not be acquainted with one, but you do know that YOUR MOTOR CAR IS A UTILITARIAN BIT OF APPARATUS. It may be just as essential to your business as your telephone or your safe, or your typewriters. As such, you should protest to YOUR CONGRESSMAN IN WASHINGTON. YOU SHOULD PROTEST TO YOUR SENATOR IN WASHINGTON. TELEGRAPH OR WRITE YOUR PROTEST, BUT DO NOT FAIL TO SEND IT. In such a protest make it clear that you, as well as the motor car industry, are prepared to share your equitable load, but you do OBJECT TO A DISCRIMINATING 5 PER CENT TAX WHICH IS NOT PLACED ON OTHER INDUSTRIES.

THE routine of this war tax at Washington is: It is to-day before the Ways and Means Committee, which was asked to draft the measure. From this committee it goes before the House, where there unquestionably will be a prolonged fight. From the House it goes to the Finance Committee of the Senate, where there will be another fight; lastly it goes on to the floor of the Senate where it is hoped there will be a prolonged discussion on it. As a motor car owner you can take your part by reaching your congressman or senator. DO IT.





Practical Preparedness

Mental Mobilization

ONE of the greatest problems to overcome so far as our attitude in the war is concerned is to mentally mobilize our population. The mobilization of the Army and Navy is one thing, but it is another thing to mobilize the minds of the people. That is the great force that is holding back the war spirit to-day. This lack of mental mobilization may be designated mental inertia. It was this mental inertia that held back England for a period of ten months at the start of the war. England fooled herself with the signs "Business as Usual." She fooled herself with a censorship which failed to let the people know the facts. She is now paying heavily for that lack of mental mobilization.

BOTH the French and English commissions now in this country are doing their utmost to prevent the United States from falling a victim to this error of mental inertia and lack of mental mobilization.

One of the best analyses of this mental inertia was given last week in an address by Pomeroy Burton, American manager of the London Daily Mail, who was in England during the ten months of 1914 and 1915, when England was going through her period of mental inertia. Mr. Burton, in speaking before 3000 members of the Merchants' Association of New York, gave one of the best expositions of what America should do in the present crisis. His words were addressed to business men, and as such we believe they are worthy of reproduction here. Mr. Burton believes that our entire country must be mentally mobilized; that we must tell the story of the present war in every way possible and to all of our industries and all of our people in order that they will be awakened to the real meaning of it. Here is how Mr. Burton put it:

"The two great needs which confront this country at this moment are:

"First, Co-ordination of effort at Washington through a War Council fully empowered to deal with all war problems, in consultation, of course, with cabinet members, legislators, experts and others, and

"Second, and equally important, an extensive and systematic campaign of information, conducted through the advertising and news columns of every useful publication in the United States, designed to make the people understand this war.

"FIVE weeks of careful inquiry convince me that the great majority of people in this country believe the war to be nearing an end.

"They look upon the entry of the United States as a part of the stage-setting for the last act of the great war-drama.

"It is the Short War fallacy in a new guise.

"But for this same Short War fallacy, the war *might* now be nearing the end—indeed, it might be over.

"The people of every nation now engaged began with the firm conviction that they were in for a short war.

"That fatal theory has entered largely into the war preparations of every country involved. It has shaped war policies. It has warped and misguided public sentiment. It has cost countless thousands of human lives. It has prolonged the war. It has been Germany's strongest ally.

"The best informed military experts believe to-day that the war is *not* nearly over. They believe its worst and most dangerous stages are still to come.

"One of the foremost men in Great Britain has stated publicly within the past week that the war's end is invisible.

"Barring possible collapse through hunger, Germany can go on for years.

"Barring possible failure to meet and overcome the submarine campaign, the Allies can go on for years.

"Neither of these contingencies should be considered for one moment in shaping the war program of this country.

"Neither one is likely to happen.



"THE only safe basis for this country to proceed upon is to assume that *the United States* alone is entering upon a war with Germany—a war which will tax its full resources and its entire fighting strength.

"The people would not fail to understand the seriousness of *that* situation.

"They would respond as one man to the call of country, for they would at once realize their own and their country's peril.

"There would be an outburst of patriotism and a rush to the flag such as this world has never seen.

"The people's hearts, souls and bodies would be offered in one grand acclaim to the country's cause—the cause of freedom and human liberty.

"There would be no politics, no divided councils, no false starts, no small handling of great problems, with a great and powerful enemy at the gates.

"No, there would be one grand, overwhelming wave of patriotism and desire to serve which would enlist automatically every ounce of energy and war spirit in the land against the common enemy.

"TO bring it home still more clearly, imagine for a moment the removal of the mighty fleet which has stood as a protecting shield between this country and Germany since the day the war began.

"Would not *that* bring a quick and a full realization of the part the people would be called upon to play in the quick mobilization of the country's whole war forces?

"Well, that is the only correct view to take of this country's responsibilities to-day. And to reach that view quickly the people must be made to understand the war as they do not, I fear, understand it now.

"For instance, they utterly fail to realize that before this war is over, this country may have to put into the firing line, and maintain there, not less than 500,000 fighting men.

"No democracy was ever effective in war without the full understanding and backing of the masses—of the working people.

"Legislation alone will not make this or any other country an effective war factor.

"This country is a long way from the battlefields of Europe, and there is no doubt that great masses of its people feel themselves apart from the conflict, not a part of it.

"They feel that it is Europe's war, and they do not understand why this country should mix up in it. They utterly fail to realize that the things involved are their own personal freedom, their own material interests, their own and their children's futures—all of which are as much at stake here to-day as they are to the people of England, and of France.

"It must be admitted that the main reason for the utter inability of the people of this country to grasp the true significance of the war to-day is the policy of suppression which has prevailed in the principal entente countries since the day the first shot was fired.

"ENGLAND'S original navy was 150,000. Her present navy exceeds half a million. In addition to the direct naval requirements, England is obliged now to supply all her troops, all her armies in distant parts, with their equipment for war and necessities of life, and in addition she is also obliged to keep huge fleets constantly busy with the transportation of coal and other essential commodities to her allies, notably France and Italy. This means an enormous sea force, in addition to the regular naval force, and the organization and control of this auxiliary navy is one of the great achievements of the war.

"That will suffice to indicate what I mean by the grand scale of preparation.

"No such scale, and consequently, no really adequate co-operation with the Allies in this war, is possible without the full and earnest co-operation of the whole people of the United States.

"I would recommend to those who are shaping the programme for war, as a preliminary to all else, a great and far-reaching campaign of information to make the people understand this war. The school-rooms, the lecture halls, the churches, the libraries, the city halls, the public squares and the movies—all the meeting places of the people in every State of the Union should resound with the voices of America's greatest and most forceful speakers, telling the people—and all of the people—the simple truth, the basic facts about this war.

"This campaign should be conducted on the same scale as if it were a presidential campaign, only the two parties, instead of flooding the country with information about the virtues of one side and the defects of the other, would be joined together in spreading all the facts about the war which it is so essential for the people to know.

"And these war facts, when told to the people, should be printed in every newspaper in the land, and should be distributed as leaflets to every household in every city and town and village of the Central and Western States.

"TELL the story of how the war began, and the facts that went before.

"Tell the story of Belgium.

"Tell the story of the shooting of Nurse Edith Cavell and Captain Fryatt.

"Tell the story of Rheims Cathedral.

"Tell the shocking story of the Belgium deportations.

"Tell the story of the starving prisoners of war in Germany.

"Tell over again the story of the Lusitania, the Arabic and the Sussex.

"Tell the story of the sinking of the Red Cross hospital ships.

"Tell the story of German machinations in this country since the war began.

"Then, and not before then, can the full force of this great country's man power and resources be made effective for war."







Drive an Army Truck!

U. S. Needs Men for Forty Trucks for Military Work

Five Companies Have Been Enrolled in Reserve Corps

NEW YORK, May 4—Wanted: Crews to man forty motor truck trains for army work. That is the content of orders issued from Washington and transferred through Major Frank H. Lawton.

The Motor Truck Club will do a large share of this work. Men will be recruited into the Quartermaster Enlisted Reserve Corps and will enlist for four years with but fifteen days' compulsory service, if so ordered.

Thirty-four drivers are needed for each truck train. This means 1360 will have to be obtained to man all the truck trains.

Committees in Boston and this city will carry on this work. Other committees will work in Atlanta, Ga., and Philadelphia. A similar committee has been formed in Boston to cover the New England states.

The drivers will be enlisted as sergeants. The enlistment station at Governors Island is to be moved to the United States Rubber Co.'s building at 1790 Broadway, New York, where application blanks can be obtained. Other stations will be opened at Philadelphia, Washington, Buffalo, Rochester, Syracuse and various cities throughout the Department of the East.

Applicants must be between the ages of eighteen and forty-five. They will be examined by a special examining board. They will be required to keep themselves physically fit for military service for four years and to attend each year, if so ordered, an army encampment for two weeks only, for which duty they will be paid. Men who enlist in this reserve retain their status as civilians, and are only required to leave their homes to attend an encampment in time of war or threatened war.

Truck drivers in the Enlisted Reserve Corps will receive \$36 a month and will have their railroad fares and general expenses paid. Uniforms will be supplied as for enlisted men of the Quartermaster Corps of the regular army reserve, except the insignia.

One company of thirty-four drivers represents a result of the work done in New York last week by the Motor Truck Club of America. In addition four other companies are virtually complete. One has been enrolled at Columbia university and another at Princeton.

CHANGES IN STOCK EQUIPMENT

New York, May 7—A number of important changes in the equipment of motor cars was made during April. The Hudson company has added a four-passenger Phaeton at \$1,750. The Stephens is now equipped

with Delco ignition, Stromberg carburetor and Delco starter. The Kissel-Kar company has changed the size of its tires on its 100-lb. model six to 34 by 4 from 33 by 4. The 6-42 and the twelve have 34 by 4½ instead of 34 by 4.

The Metz company is now equipping its cars with Atwater Kent ignition and Westinghouse starting and lighting. The King company is now using the Bijur starter and lighting. Paige is equipping its model 6-51 with the Remy starter and the 6-39 with the Stromberg carburetor. Regal has changed to Heinze-Springfield ignition and starter on its model 4-32. Empire is using Connecticut ignition on its model 45 and has also changed to dry-plate clutch instead of cone. The Empire company has dropped the old model numbers and has substituted the numbers 50, 51 and 70A. Model 51 is precisely the same as Model 50, except that it has wire wheels and sells at \$1,165, compared with \$1,125 for Model 50.

The Chalmers wheelbase is now 117 instead of 115 in. Apperson has changed the bore of the eight to 3¼ by 5 from 3¼ by 5, increasing its S. A. E. hp. from 23.4 to 33.2. Pullman now uses Atwater Kent ignition and Dyneto starting and lighting.

The new 6-60 Abbott will have a 7N six-cylinder Continental engine, 3½ by 5¼, Remy ignition, starting and lighting, Stromberg carburetor, dry-plate clutch, three-speed gearbox, 122 in. wheelbase, 34 by 4 straight side tires. It will be made as a seven-passenger open car at \$1,595, coupe at \$2,100 and a Sedan \$2,150.

The bore of the Chandler has been increased from 3⅞ to 3½, the stroke remaining at 5 in.

CORRECTION

Detroit, May 4—The new price of the car made by the Ross Automobile Co. is \$1,750 and not \$1,775, as announced in MOTOR AGE of April 27. The increase was made from \$1,550.

REDDEN ASKS INJUNCTION

Chicago, May 5—Another development in the patent controversy among truck-forming makers has been made through the petition of the Redden Motor Truck Co. and Albert E. Cook, owner of the Cook truck-forming patents, in the United States District Court here for an injunction ordering the Smith Motor Truck Corp. to discontinue manufacturing Form-a-trucks. Infringement of the petitioner's patent rights is alleged.

This petition is another step in the suit brought last August in the United States District Court in Chicago by Cook and the Redden company, in which infringement of the Cook patents is claimed. The suit is still pending. The Smith company filed suit in October in the circuit court of Cook county to restrain Cook and Charles W. Hills, attorney for Cook and the Redden Motor Truck Co., from representing that they have a valid contract under which the Smith company has agreed to pay royalties for operating under these patents.

War Boards for Civilians

Citizens of Country to Mobilize Their Services to Aid U. S.

Official Approval From Capital Is Understood

CHICAGO, May 8—Approval is understood to have been given by the War Department for the organization of a national service reserve made up of men not eligible to be drafted into the army and of women, these to be available for any service they can perform for the government, such as aid in recruiting, work under those having government contracts, or on farms to increase the supply of food for the army and navy.

As an indication of the feasibility of such a plan, Chicago yesterday organized a citizens' war board with more than 300 representative men and women as its incorporators. Until the war is over this organization will act as the clearing house of men, materials, wealth and relief, co-operating with the state and national councils of defense. It will take up the self-imposed duty of mobilizing every resource and energy of the Chicago district and co-ordinating all war activities.

Some of the big steps that may be undertaken are:

A Registration of Chicago's man power that all may be of some service.

B Cataloging and mobilizing of Chicago's industrial resources for intelligent service to an army in the training camp or in the field.

C Mobilization of the city's finances so that its money power may be laid upon the altar of service to the country.

D Marshaling of Chicago's overflowing patriotism into an effective force capable of spreading its influence and enthusiasm where the greatness of the nation's opportunities in this crisis have not been realized.

Other cities are expected to fall in line and organize so that every American can be of service to his or her country, especially those not eligible to go to the firing line.

WHITE MOTOR CO. ELECTS

Cleveland, Ohio, May 5—The White Motor Co. held an election today, and the following officers were elected: President, W. T. White; first vice-president, W. C. White; second vice-president, E. W. Hulet; secretary, A. R. Warner; treasurer, Otto Miller; chairman of the board, M. B. Johnson. The officers and J. R. Nutt, J. H. Harding, Theodore Roosevelt, Jr., E. R. Tinker and A. M. Hall, II, comprise the newly elected board of directors.

conditions similar to those often encountered in America, and more provision should be made to keep this dust out of the carburetor and the crankcase breather. It is difficult to abolish engine shields, particularly if the engine is mounted on a flexible sub-frame. It is not difficult, however, to design an engine shield which can be let down and put back as easily as opening and closing a door.

It is surprising that some shields should be so good and some so bad. If the crankcase has cast webs, it is essential that the flywheel be completely inclosed, and an adequate shield for this and the gears is apt to be much more complicated than full shielding.

Radiators Might Be Interchangeable

Interchangeability of radiators would be a very good feature, but it is difficult to see how it could be carried out while engine design varies so much and no two engines require the same amount of cooling area. To make this provision really effective, water passages, valve area, port area and exhaust manifold would all have to be studied and rendered more or less uniform. It would certainly be advisable to abolish the belt and make the fan gear driven, as is now done by Spa. A radiator guard is absolutely essential. Front fenders suffer more than radiators from minor collisions. They should be attached by two stout brackets to main frame members and be entirely independent of the running boards. A uniform type of fender and mounting could easily be arranged.

Four-speed gearsets are essential for army service under varied conditions. In order to obtain a symmetrical layout of the gearset Spa has abolished direct drive on all its trucks and has reduced annular ball bearings in the transmission to two types and one type of thrust bearing. Also all joints are lapped. This is an important matter from the standpoint of the repair departments, and deserves to receive very close attention.

Practically all the Italian shaft-driven models have a two-piece stamping for rear axle and propeller shaft housing, these two halves—upper and lower—being bolted together. A yoke is mounted on the forward end of the housing, and there is but one universal in the system, this being in a separate metal housing just back of the gearbox. In service this type of axle has stood up very well.

From a repair shop standpoint, with few facilities available, there is the disadvantage that before any work can be done the entire axle and propeller shaft must be taken down. This in itself is a simple job, but when the unit is out a big series of bolts must be withdrawn to disassemble the two halves of the housing, and the replacing of this unit is rather a delicate matter. This of course applies to work done in temporary repair shops at the front; with factory assembly the job is simple.

Every make of axle having Hotchkiss drive could be demounted and assembled much more rapidly than the Italian type. Hotchkiss drive is not made in Italy to any appreciable extent, but the few foreign cars and light trucks working there with this system were satisfactory. There is no reason why Hotchkiss drive should be taboo on principle.

Inclosed chain drive is in such an immense majority on the Italian front that it is difficult to make comparisons. There are no worm-driven axles in service in Italy. One foreign make of double reduction axle gave endless trouble and the trucks could never be loaded to their full capacity. The same happened to these trucks on another front. It would not be just to blame the system, however, for it was obvious that there were many defects of material and design in this particular make.

In truck specifications, more attention should be paid to a uniform turning radius. This is important on all fronts, but particularly so under the mountain conditions of Italy. As an instance, Buick and G. M. C. convoys had to be kept separate, for the latter could not tackle hairpin turns which were negotiable by the former. Trucks working at the front are constantly obliged to turn on narrow and rough surfaced roads. An inadequate lock causes much delay, and even one truck can hold up an entire convoy. Steering knuckle tie rods should certainly be located behind the front axles.

Cast-steel wheels have proved their worth to such an extent that the wood variety will soon be an object for the museum. There is easily room for more uniformity in tires. The usual size on Italian service, for $3\frac{1}{2}$ -ton trucks, is 900 by 120 twin—35.4 by 4.7 in.—an alternative

being 50 by 5.5-in. twin. In some cases very small diameter wheels have been adopted as the quickest and easiest way of getting a low gear ratio when work has to be done on steep hills with good surfaces. From a tire standpoint this plan is not very satisfactory.

Practically the standard wheelbase on Italian $3\frac{1}{2}$ -ton trucks is 141 in., with an available body length of 156 in. — distance measured from dashboard. Electric lighting has not proved very satisfactory in war service. Oil lamps and a single acetylene headlight on the dash are adequate and simple. It is folly to put a headlight out in front of the radiator. Exhaust pressure fed gasoline gives trouble in war service, no matter how well the system is installed. When pressure feed is used an auxiliary hand pressure pump on the dash is indispensable. Dash should be metal, not wood. Driver's top must be independent of top over body of truck. A road sprag is essential. Towing hooks should be fitted to all four corners of chassis, both trucks and ambulances. Bolts are preferable to rivets for attaching towing hooks. As result of war service, some makers are now bolting their frames together instead of riveting them. Ambulances without towing hooks often have their rear cross frame member bent by using it for towing.

Tool Equipment

Tool equipment should comprise a set of wrenches to fit all nuts on truck, mag-neto wrench, two screwdrivers, pair pliers, valve lifting tool, carburetor nozzle wrench, two files, grease gun, oil can, a powerful jack, can of soft grease, one gallon of engine oil—minimum—a wood lever armed with sheet steel, not less than 6 ft. in length, and a spade. These two latter items are indispensable for getting a bogged truck on to the road.

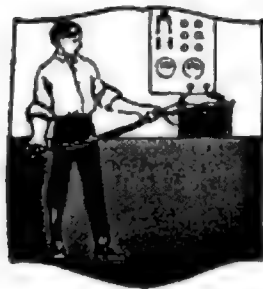
Theoretically, every truck going in war service should carry a liberal supply of spares comprising valves, plugs, nuts, cotter pins, washers, electric cable, carburetor float, etc. In practice to give these out to every driver would be equivalent to throwing money away. No matter how severe the discipline and how good the organization, drivers will not take care of spare parts; when a part has been lost the recognized practice is to borrow that part from the next car during the driver's absence. Drivers are continually complaining that radiator caps, hub caps, greasers, oil cans and tools are stolen by other men who have lost these articles. The only practical system is to give each driver the necessary tools and place all spares in charge of a mechanic who will give them out as required. If the trucks are working from a fixed base, the parts will be kept at that base. If the trucks are constantly on the move, then the spares should be placed in charge of a sergeant or corporal. One set of spares for six cars is quite a sufficient proportion.

MOTORS LEAD RAILROADS

New York, May 4—American transportation now must look to the motor car as its chief factor. The car has caught up with and passed the railroads in importance as a factor in transportation in this country. In a recent issue, the Wall Street Journal declares that motor cars will carry many more passengers than the steam lines this year.

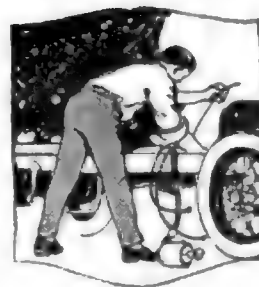
On a basis of 3,000,000 passenger cars in use this year, and an average mileage per car of 6000, the motor car mileage for 1917 will be 18,000,000,000, assuming an average load of three passengers. The passenger mileage by motor for 1917 will be 54,000,000,000. Railroad traffic now amounts to 35,000,000,000 passenger miles yearly, which is less than the passenger mileage of motor cars, if we assumed an average load of two.

Motor car competition affects chiefly the railroads in the thickly settled eastern portions of the country, this authority states, the big cities and the recreation regions.



Electrical Equipment of the Motor Car

By David Penn-Moreton & Darwin S. Hatch.



Editor's Note—Herewith is presented the forty-second installment of a weekly series of articles begun in MOTOR AGE issue of June 29 designed to give the motorist the knowledge necessary to enable him to care for and repair any and all of the electrical features of his car, no matter what make or model it may be. At the conclusion of this series, "Electrical Equipment of the Motor Car," with additions, will be published in book form by the Class Journal Co., Chicago, in a size to fit the pocket conveniently.

The fundamentals of electrical circuits of the motor car were explained through their analogy to water systems, and the relations of current pressure and resistance were brought out. This was followed by an explanation of series and multiple circuits, how electricity is made to do work in lighting, starting, signalling, etc. Calculating the capacity of a battery for starting and lighting and the cost of charging storage batteries and determining the torque a starting motor must develop were explained. Action of primary batteries and dry cells was considered. A section was devoted to the makeup and action of lead and Edison storage batteries, and another to the care of lead batteries in service and the best methods of charging them. Magnets and electromagnetism then were considered, and the principles of generators and motors explained.

Part XLII—Operating Voltage

STARTING, lighting and ignition systems may be classified according to the value of the operating voltage into two main groups as follows: Single voltage systems and multiple voltage systems.

Single-Voltage Systems

A single-voltage system, as its name indicates, is a system employing a single voltage for all the electrical operations. The value of this voltage, as used at the present time, is in the great majority of cases either 6 volts or a multiple of 6 volts, such as 12, 18, etc. The selection of the value of 6 as a unit is due to the voltage required in operating the old battery ignition systems, when dry cells were used and the three storage cells seemed to give very satisfactory results when used to replace the dry cells. The advancement made in the last few years in the manufacture of efficient low-voltage charging generators and motors has done a great deal toward making these lower voltages standard rather than the higher values as originally used. The filaments of the lower voltage lamps are more rugged than those of the higher voltage ones of the same candlepower, which is in favor of the use of the lower voltage system. The losses in the lower voltage systems are apt to be quite a bit greater than

in the higher voltage systems, due to the fact that a higher current will be required for a given power unless a larger size wire and larger switch contact areas be employed.

Multiple-Voltage Systems

Multiple voltage systems are those employing more than one voltage. In systems of this kind two voltages are usually employed, one for charging the battery and then a higher voltage for operating the starting motor. In such systems the battery usually is split into two sections. These two sections normally are connected in parallel, and the voltage of the charging generator is such that the battery may be charged while connected in this way. A change in connections usually is made at the starting switch when the starting motor is to be operated, which results in the two sections of the battery being connected in series, and the voltage applied to the starting motor is that of the two sections combined. A good example of a system of this kind is found in the Simms-Huff system, as shown in Fig. 245. The connections are shown diagrammatically in Figs. 246 and 247 for the charging and starting position of the starting switch.

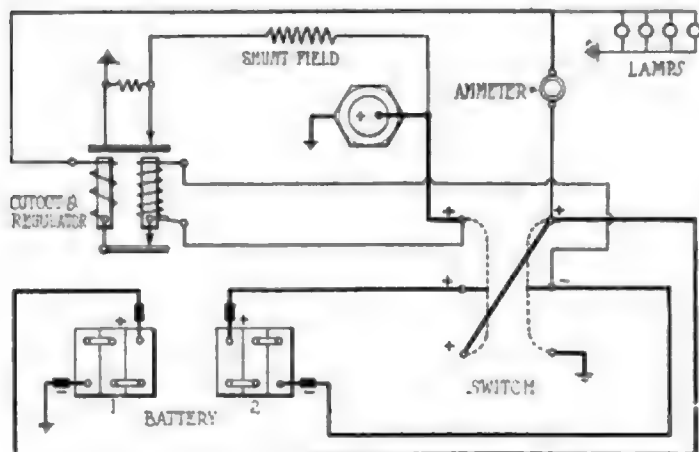


Fig. 245—Simms-Huff system, which is a multiple-voltage system in which the two battery sections are connected in series

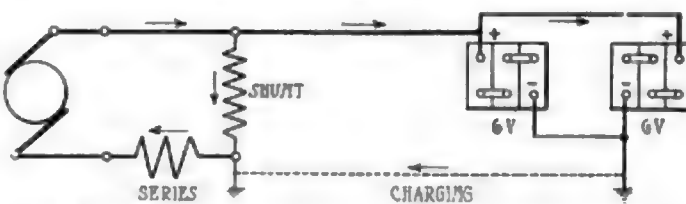


Fig. 246—The charging position of the starting switch, showing the connections at that position

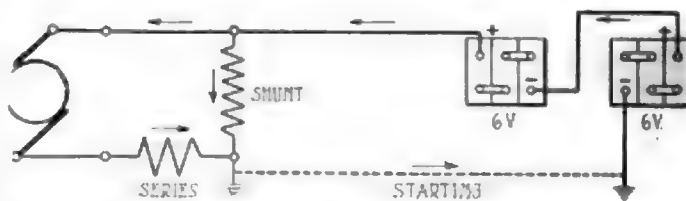


Fig. 247—The starting position of the starting switch, showing the connections at that position

In this system the generator and motor actions are combined in a single machine.

In some of the earlier forms of Delco equipment the battery was composed of twelve cells, which were connected in four groups of three cells each. These groups were connected in parallel while charging and in series for operating the starting motor by quite a complicated switch. These switches were mounted on the end of the battery box proper and alongside an ampere-hour meter.

S. S. E. PLANT ABOUT READY

Philadelphia, Pa., May 4—The plant of the S. S. E. Co., Philadelphia, is completed and will soon be in readiness to make \$5,000 chassis. Victor Lee Emerson, president of the company, states that although nothing will be turned out for three months, the plant is sold ahead for one year.

The Junior Racing Car

(Continued from page 37)

two pieces of strap iron and an iron carriage bolt.

The axles should be placed in the center of the springs; that is, equi-distant from the front and rear ends. This will provide an equal action on the spring and will lessen the chance of a break as well as giving better action.

Axles are the next thing to be considered. The front axle is far more important than the rear.

There are several designs for front axle construction, but only the most practical will be considered here. The most desirable, of course, is of drop-forged Vanadium steel, but the construction of this type necessitates much labor and is quite expensive. If this type is desired, I would advise the builder to consult with a first-class machinist before attempting work on it. The cast-steel axle is very desirable, but here again expense enters into the situation, as it is necessary that patterns be made and neither of the above types, to the best of my knowledge, can be secured from manufacturers. The simplest design is illustrated here.

Two pieces of $\frac{3}{4}$ -by $1\frac{1}{2}$ -in. strap iron are secured. They are bent, as is shown in Fig. C, No. 1, to form a yoke for the reception of the steering-knuckles. A piece of $1\frac{1}{2}$ -by 2-in. ash is placed between the two pieces of iron and bolted securely, No. 2, Fig. C. It is necessary to see that small blocks are placed between the strap iron pieces on the outside of the frame members to give them support in the vicinity of the king-bolt holes for the steering-spindle, No. 3. Two holes, one on either end, are bored through both pieces of strap iron for the steering-spindle, the bottom holes $\frac{1}{2}$ -in. closer to the frame than the top holes, No. 4. This will give the wheels a dish which will make the car easier to handle. This makes the ideal, inexpensive front axle for the light car and one that any youth can build.

(Concluded next week)

Alcohol from Sawdust

Canadian Process for Production of Motor Fuel Is Reported

New Method Would Utilize Wood Waste From Forests

MADISON, Wis., May 4—According to reports here, there has been developed in Canada a process for the production of alcohol for motor fuel from sawdust which gives much promise. The report states:

"An enormous supply of wood waste is available in the great valleys of the Willow, Nechako, Bulkley and Skeena rivers in Central British Columbia, where the forests have been giving way to agriculture in part, but where there is still a limitless supply of big timber. This territory has recently been opened up by the new transcontinental Grand Trunk Pacific, and it is on woods taken from this region that the experiments for the production of alcohol have been carried on. The wood waste is broken down by distillation, and the wood alcohol produced converted by simple processes into true grain alcohol.

"Although the calorific power of alcohol is little more than one-half that of gasoline, its greater efficiency—alcohol, 28 per cent; gasoline, 16 per cent—compensates for this. This higher efficiency of alcohol is due to various causes, chief among which are the following:

"1—The volume of air required for complete combustion of alcohol is only about one-third that required by gasoline, and thus much less energy goes away in the exhaust. Moreover, this small dilution with air enables a more perfect mixture to be formed with consequent more perfect combustion.

200-lb. Pressure

"2—The alcohol-air mixture can be safely subjected to pressures of 200-lb. per square inch without spontaneous ignition, whereas the safety limit for gasoline is 80 lb. per square inch.

"3—All mixtures of alcohol and air containing from 4 to 13.6 per cent of alcohol are explosive, whereas the explosive range for gasoline is from 2 to 5 per cent, necessitating much more careful carbureter adjustment.

"4—The combustion products of alcohol are smokeless, almost odorless, and do not clog up the cylinders and valves.

"The only serious difficulty encountered would be the starting of the engine in cold weather, and this could be provided for by carrying a small auxiliary gasoline tank to be used in starting.

"Of all the possible sources, the most interesting, owing to the low cost of raw material, is the waste from the lumber industry, particularly that in the form of sawdust or small chips. This material in the vicinity of sawmills or woodworking plants

is often an item of loss, owing to its production in excess of their own power requirements, its value never rising above 50 cents a ton, even when used as a source of power. The disposal of this superfluous waste costs from 20 to 66 cents a cord of 1800 lb.

"From experiments which have been carefully conducted by various experimenters a ton of dry sawdust has been found to yield with proper treatment about 20 to 25 gal. of 95 per cent alcohol—ethyl or grain alcohol, not wood alcohol, for this latter is useless for fuel purposes, owing to the formation of products of combustion which would wreck the cylinders—and we could have, therefore, an estimated production from this source alone of around 500,000,000 gal. annually."

NEW STUDEBAKER PLANT

Saginaw, Mich., May 5—The Studebaker Corp. of America will erect a large assembling plant at Saginaw and will employ 700 men here. This plant is to be established in an effort to overcome transportation difficulties arising from freight car shortage.

STECKELS SELLS INTERESTS

New York, May 4—E. H. Steckels, president of the Holt-Weltes Co., Inc., sole distributor for the Branford carbureter, has resigned and has sold his interests to the Malleable Iron Fittings Co., Branford, Conn. Mr. Steckels will enter business again as a manufacturers' distributor.

MAXWELL HAS RECORD SALES

New York, May 4—Sales of the Maxwell Motor Co. for the first three months of this year were more than 58 per cent larger than for the corresponding period last year. The total for the quarter was 19,000 cars against 12,032 cars in the first quarter of 1916. Indications are that after the usual dividends of \$3,000,000 and a possible Government tax of between \$500,000 and \$600,000 almost \$2,000,000 will be carried to surplus account.

EVINRUDE BUYS SITE

Milwaukee, Wis., May 4—The Evinrude Motor Co., Milwaukee, Wis., has purchased a 10-acre tract of land as a site for its new plant, to cost about \$250,000 complete. The Evinrude company will engage in the manufacture of a line of internal combustion engines for farm and general utility purposes, these being designed to use kerosene and the heavier distillates of petroleum as fuel but will continue to make rowboat motors. The present plant will be abandoned on the completion of the new works. Contracts will be awarded about May 28 for the erection of the new group, the main buildings of which will be a machine shop, 300 by 300 ft., and a gray iron foundry, 80 by 200 ft. A brass foundry unit also will be provided.



Routes and Touring Information



Chillicothe, Mo.—Elkhart, Ind.

CHILICOTHE, Mo.—Editor *MOTOR AGE*—Give best routing from here to Elkhart, Ind., so as to include the large cities en route.—Leo Hirsh.

From Chillicothe proceed to Frankfort, Austin, Xenia, Dayton, Eaton, Richmond, Ind., Centerville, Germantown, Dunreith, Greenfield, Indianapolis, Royalton, Lebanon, Mechanicsburg, Antioch, Frankfort, Lafayette, Montmorenci, Wolcott, Remington, Thayer, Crown Point, Schererville, Highland, Calumet, East Chicago, South Chicago, Chicago, East Chicago, South Chicago, Calumet, Gary, Miller, East Gary, Porter, Michigan City, New Carlisle, South Bend, Mishawaka, to Elkhart.

Vol. 4 of the Automobile Blue Book, published by the Automobile Blue Book Pub. Co., 910 S. Michigan Ave., Chicago, contains complete running directions for this trip.

Chicago, Ill.—Ashland, Wis.

Elkhart, Ind.—Editor *MOTOR AGE*—Give me the best and direct route from Chicago to Ashland, Wis.—P. M. Cochran.

From Chicago proceed to Maywood, Addison, Ontarioville, Elgin, Coral, Harmony, Marengo, Garden Prairie, Belvidere, Rockford, Beloit, Wis., Janesville, Edgerton, Stoughton, McFarland, Madison, Waunakee, Dane, Lodi, Oke, Merrimac, Baraboo, Plainville, Quincy, Holmsville, New Rome, Grand Rapids, Plover, Stevens Point, Mosinee, Rothschild, Wausau, Medford, Chelsea, Westboro, Ogema, Phillips, Ffield, Park Falls, Butternut, Olidden, Cayuga, Mellen, High Bridge, Marengo, Ashland.

Vol. 6 of the Automobile Blue Book, published by the Automobile Blue Book Pub. Co., 910 S. Michigan Ave., Chicago, contains complete running directions for this trip.

St. Louis, Mo.—Joplin, Mo.

St. Louis, Mo.—Editor *MOTOR AGE*—Give a route from here to Joplin direct, avoiding Kansas City.—Walter B. Yost.

From St. Louis proceed to Gray Summit, Union, Anaconda, Sullivan, Leasburg, Cuba, St. James, Rolla, Edgar Springs, Licking, Raymondville, Houston, Simmons, Cabool, Dunn, Mountain Grove, Norwood, Macomb, Mansfield, Diggins, Fordland, Rogersville, Galloway, Springfield, Republic, Billings, McKinley, Marionville, Aurora, Verona, Pierce City, Wentworth, Diamondville, Joplin.

Vol. 6 of the Automobile Blue Book, published by the Automobile Blue Book Pub. Co., 910 S. Michigan Ave., Chicago, contains complete running directions for this trip.

Boston, Mass.—Youngstown, Ohio

Athol, Mass.—Editor *MOTOR AGE*—Publish best route from here to Youngstown, Ohio, and approximate mileage.—George Mack.

From Boston proceed to Brookline, Auburndale, Wayland, Marlboro, Northboro, Worcester, Leicester, Brookfield, Warren, Palmer, N. Wilbraham, Springfield, Longmeadow, Thompsonville, S. Windsor, Hartford, Farmington, Plainville, Southington, Marion, Waterbury, Middlebury, Southbury, Sandy Hook, Newtown, Danbury, Pawling, Beekman, Noxon, Arlington, Poughkeepsie, Staatsburg, Rhinebeck, Red Hook, Livingston, Hudson, Stockton, Rensselaer, Albany, Schenectady, Amsterdam, Fort Johnson, Fonda, Little Falls, Herkimer, Ilion,

Frankfort, Utica, Vernon, Wampsville, Canastota, Manlius, Center, Syracuse, Camillus, Auburn, Seneca Falls, Waterloo, Canandaigua, Lima, Avon, Batavia, Buffalo, Evans, Brant, Irving, Silver Creek, Fredonia, Portland, Westfield, Ripley, North East, Pa., Harbour Creek, Erie, Girard, Conneaut, Ash-tabula, Geneva, Unionville, Painesville, Willoughby, Cleveland, Chagrin Falls, Welshfield, Southington, Warren, Youngstown. This routing approximates 375 miles.

Vols. 2, 1 and 4 of the Automobile Blue Book, published by the Automobile Blue Book Pub. Co., 910 S. Michigan Ave., Chicago, contain complete running directions for this trip.

Decatur, Ill.—Chattanooga, Tenn.

Mayfield, Ky.—Editor *MOTOR AGE*—Furnish routing from Decatur, Ill., to Chattanooga, Tenn.—Erie B. Besley.

From Decatur proceed to Assumption, Pana, Oconee, Ramsey, Vera, Vandalia, Bluff City, Augsburg, Salem, Dix, Mount Vernon, Bonnie, Ina, Benton, Frankfort, Johnston City, Marion, Willeford, Ozark, Ganntown, Round Knob, Metropolis, Maxon Mill, Ky., Paducah, Briensburg, Eggners Ferry, Cadis, Hopkinsville, Clarksville, Adams, Cedar Hill, Springfield, Nashville, Tenn., La Vergne, Murfreesboro, Beechgrove, Manchester, Hillsboro, Pelham, Wonder Cave, Monteagle, Tracy City, Jasper, Rankins Ferry, Wauhatchie, Chattanooga.

Vols. 5 and 6 of the Automobile Blue Book, published by the Automobile Blue Book Pub. Co., 910 S. Michigan Ave., Chicago, contain complete running directions for this trip.

Dubuque, Iowa—Denver, Colo.

Freeport, Ill.—Give best route from Dubuque to Minneapolis and then to the Black Hills on to Denver.—James O'May.

Do not plan on going through the Black Hills as it is not advisable. We suggest the following route: From Dubuque, Iowa, go to Farley, Dyersville, McGregor, Prairie du Chien, Mount Sterling, Liberty Pole, Viroqua, Portland, La Crosse, LaCrescent, Ridgeway, Witoka, Winona, Lewiston, St. Charles, Chester, Rochester, Pine Island, Zumbrota, Hader, Cannon Falls, St. Paul, Minneapolis, Excelsior, Victoria, Waconia, Young America, Norwood, Glencoe, Sumter, Brownston, Stewart, Buffalo Lake, Hector, Bird Island, Olivia, Montevideo, Milan, Appleton, Ortonville, Big Stone City, Millbank, Altamont, Clear Lake, Brookings, S. D., Dell Rapids, Sioux Falls, Canton, Beloit, Fairview, Hudson, Hawarden, Akron, Westfield, Sioux City, Homer, Winnebago, Oakland, Craig, Tekamah, Blair, Omaha, Elkhorn, Waterloo, Valley, Fremont, Ames, North Bend, Schuyler, Richland, Columbus, Duncan, Central City, Grand Island, Wood River, Shelton, Gibbon, Kearney, Odessa, Overton, Lexington, Cozad, Gothenburg, North Platte, Sutherland, Paxton, Ogallala, Brule, Big Springs, Chappell, Lodgepole, Sunol, Sidney, Potter, Dix, Kimball, Bushnell, Neb., Pinebluff, Wyo., Egbert, Cheyenne, Fort Collins, Loveland, Berthoud, Longmont, Denver.

Vol. 5 of the Automobile Blue Book, published by the Automobile Blue Book Pub. Co., 910 S. Michigan Ave., Chicago, contains complete running directions for this trip.

Cleveland, Ohio—Ogunquit, Me.

Bloomington, Ind.—Editor *MOTOR AGE*—Give best route from Cleveland, Ohio, to Ogunquit, Me., by Buffalo, Albany and Boston; also give

distances from each place named.—J. D. Showers.

From Cleveland, Ohio, go to Willoughby, Painesville, Unionville, Geneva, Ashtabula, East Village, Conneaut, Girard, Erie, Harbour Creek, Moorheadville, North East, Pa., Ripley, N. Y., Westfield, Portland, Brocton, Fredonia, Sheridan, Silver Creek, Irving, Farnham, Buffalo, Caledonia, Avon, Canandaigua, Geneva, Seneca Falls, Auburn, Sennett, Camillus, Syracuse, Manlius Center, Mycenae, Utica, Frankfort, Mohawk, Herkimer, Little Falls, St. Johnsville, Nelliston, Palatine Bridge, Fonda, Tribes Hills, Amsterdam, Scotia, Schenectady, Albany, Rensselaer, E. Greenbush, Nassau, West Lebanon, New Lebanon Center, New Lebanon, Shaker Village, Mass., Pittsfield, Lenox, Lee, Bonnyrigg, Chester, Huntington, Russell, Westfield, W. Springfield, Springfield, N. Wilbraham, Warren, Brookfield, Spencer, Leicester, Worcester, Shrewsbury, Northboro, Marlboro, So. Sudbury, Weston, Auburndale, Newton, Boston, Cambridgeport, Medford, Everett, Revere Beach, Lynn, Swampscott, Salem, Beverly, N. Beverly, Wenham, Hamilton, Ipswich, Rowley, Newbury Old Town, Newburyport, Salesbury, Smithtown, N. H., Hampton Falls, Hampton, Portsmouth, Kittery, Me., York Corners, York Village, York Harbor, York Beach, Ogunquit.

Vols. 1 and 2 of the Automobile Blue Book, published by the Automobile Blue Book Pub. Co., 910 S. Michigan Ave., Chicago, contain complete running directions for this trip.

Flint, Mich.—Gaffney, S. C.

Gaffney, S. C.—Editor *MOTOR AGE*—Give best route from Flint, Mich., to Gaffney, S. C.—B. L. Hames.

From Flint, proceed to Fenton, Hartland, Brighton, Ann Arbor, Saline, Milan, Dundee, Ida, Temperance, Toledo, Stony Ridge, Lemoyne, Woodville, Fremont, Clyde, Bellevue, Norwalk, Townsend, Oberlin, Elyria, N. Ridgeville, Dover, Cleveland, Brecksville, Richfield, Ohent, Akron, Uniontown, Greentown, New Berlin, Canton, Massillon, Navarre, Justus, Beach City, Strasburg, New Philadelphia, Midvale, Ulrichsville, Dennison, Laceyville, Cadis, Georgetown, Pleasant Grove, Colerain, Bridgeport, Wheeling, W. Va., Elm Grove, Claysville, Washington, Scenery Hill, Beallsville, W. Brownsville, Brownsville, Uniontown, Hopwood, Farmington, Somersfield, Addison, Keyzers Ridge, Grantsville, Frostburg, Cumberland, Hancock, Clear Spring, Hagerstown, Williamsport, Falling Water, Martinsburg, W. Va., Darkesville, Bunker Hill, Winchester, Middletown, Strasburg, Toms Brook, Maurertown, Woodstock, Edinburg, Mount Jackson, Lacey Springs, Harrisonburg, Mount Crawford, Burkettown, Mount Sidney, Rolla, Staunton, Greenville, Midway, Fairfield, Timber Ridge, Lexington, Fancy Hill, Natural Bridge, Buchanan, Troutville, Cloverdale, Roanoke, Rockymount, Martinsville, Ridgeway, Va., Price, N. C., Stoneville, Madison, Stokesdale, Kernersville, Winston-Salem, Hanes, Farmington, Mocksville, Statesville, Barium Springs, Troutmans, Mooresville, Mount Mourne, Davidson, Cornelius, Huntersville, Croft, Charlotte, Belmont, Gastonia, Kings Mountain, Grover, Blacksburg, S. C., Gaffney.

Vols. 4 and 6 of the Automobile Blue Book, published by the Automobile Blue Book Pub. Co., 910 S. Michigan Ave., Chicago, contain complete running directions for this trip.

Old National Pike

Delmont, Pa.—Editor *MOTOR AGE*—Is the old National Pike from Washington, Pa., to Columbus, Ohio, an improved highway?—H. N. Smith.

This has been improved with the exception of 12 miles which are to be bricked this summer.

der side of the rear spring clips, bent to the proper angle and threaded. They should both screw into the 1-in. malleable tee and after being bolted to the frame, be free from any considerable binding. This will require a nicety of fit which will demand careful measurements, bending and drilling.

All the threads on the tee and street L should be tapped out slightly so that they will be not too tight giving free motion. The male threads should all be long. The joint at A will allow the trailer an up and down motion; that at C will permit turning and that at D the twisting motion caused by one wheel raising. The short piece of 1-in. pipe making the joint D makes a receptacle for the tongue of $\frac{3}{4}$ -in. pipe or 1-in. round iron. Any other rigid coupling scheme might be welded or otherwise fitted to this pipe.

When not in use unscrew at C after detaching the tongue.

Another method, Fig 3, would call for the use of a lathe and a brass casting.

Turn a perfectly spherical ball on the end of a bracket as shown and on the inside of the brass casting E make a socket that will exactly fit the ball and extend one-fourth to one-third the diameter beyond the largest diameter of the ball.

After fitting the ball perfectly and seeing that the movement is free in every direction, take a small hammer or a plumber's calling tool and with light blows gradually work the opening smaller around the base of the ball until the ball cannot be removed.

When this device is not in use, lash the free end to the spring with a short strap.

VALUE OF A PUMP IN A GARAGE

Some Information On Storing Space and Wash Racks

Louisville, Ky.—Editor *MOTOR AGE*—I have a lot 82 by 100 ft. in the middle of a block with a 60 ft. asphalt street in front and a 30 ft. alley in the rear, and wish to build a garage, showroom and repair shop on the first 100 ft. Would like your idea as to how I may use this space to the best advantage with a ramp to the second floor, or if an elevator could be used to better advantage. How much space is it customary to leave between cars? Is it satisfactory to wash

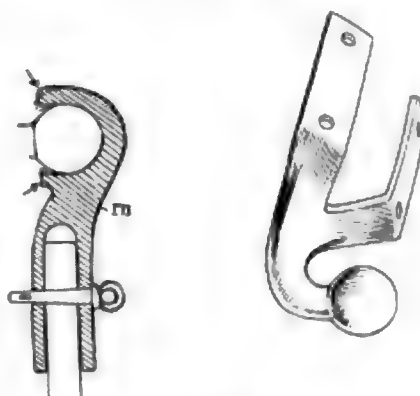


Fig. 3—A more expensive trailer hitch for use with Ford cars. It is designed to clamp under the clips of the rear spring

cars in their stalls? If so, how much space should be left between cars? What is the best way to light a garage and washstand? How many cars would this garage take care of? What firms design garages?—A. B. Thompson.

You cannot store more than forty cars in this garage, assuming that you allow a space 30 by 40 for your shop and a space at the front of the building about the same size, although possibly not the same dimensions for showroom, accessory store, etc.

A ramp is, generally speaking, more advisable than an elevator for a building of this size, but it is questionable whether it would not be better to build on the 200 ft. of the lot rather than put a two-story building on the front 100 ft. There are no disadvantages in using a ramp, except that it takes up space, and in a building of this size, it is often possible to work the ramp in such a way that it will not make very much difference in the number of cars that can be stored.

The space per car should be 7 ft. and this must be net. In other words, any space allowed for posts should be added to this. It is not satisfactory to wash cars in their stalls for a great many reasons. In the first place, the light is usually bad, in the second place, there is the danger of splashing adjoining cars, and finally, if this method were used, it would be necessary to

allow a prohibitive amount of space between each two cars.

If you object to having the usual wash-rack, you might follow the method used in the Hudson Garage in New York, in which there is a portable washer running on tracks up and down the aisle. When a car is to be washed it is simply pushed out into the aisle and the washer run over it. The washer is connected to a nearby pipe and curtains are put up, or rather dropped, to separate this car from adjoining cars, but there is a free view up and down the aisle, so that it is not necessary to use artificial light and so that better ventilation is obtained.

There is no concern which makes a specialty of designing garages.

No Ford Axles on Renault

Denver, Col.—Editor *MOTOR AGE*—I have a Renault chassis with four-cylinder 24 by 44 engine. This weighs 1150 lb. without front and rear axles and wheels. As these axles are not standard tread and are exceptionally heavy, for they weigh 475 lb. with wheels, I wish to replace them. I intend to rebuild this chassis and fit a couple of light seats as this engine in actual road work on the old chassis has turned about 2400 r.p.m.

1—I desire to fit a set of Ford axles to this chassis on account of their lightness and small upkeep expense. Is there any reason why this should not prove successful if properly done?

2—As these axles would carry semi-elliptic springs, would they need reinforcing, especially the housing on the rear axle except for a good heavy truss rod?

3—Would you consider them strong enough for this chassis?

4—Also would it be worth while to have the old valves reamed out and larger ones fitted. If so, how much larger can they be?—Clifford W. Kirkley.

1-2-3—Do not attempt to fit Ford axles to this chassis as they are far too light. The Ford axles are designed to be used with the Ford engine and chassis and will not stand up properly when used with a heavy car as you mention.

4—This depends on how much stock there is around the present valve openings. If you wish to use the engine for fast work, it may pay you to ream the valves to a larger diameter. You would probably be safe in reaming them $\frac{1}{4}$ in. over their present size.

Eddie Pullen's Mercer

South Bend, Ind.—Editor *MOTOR AGE*—What has become of the two Amplex cars entered at Indianapolis in 1911?

2—Has the Monroe M-4 touring car aluminum pistons or cast iron?

3—Illustrate the Mercer driven by Eddie Pullen last year.—Harold D. Crocker.

1—To the best of our knowledge they are not being raced any more and we do not know whether they are still in operating condition or have been scrapped.

2—Cast iron.

3—Shown in Fig. 1.

Rims to Use on Ford

St. Peter, Mont.—Editor *MOTOR AGE*—Which style of demountable rim do you recommend for the Ford car, the solid type or the kind that can be opened by releasing a lock on the inside of the rim; also which style tire, clincher or straight side, would you prefer for use on a demountable? The clincher type seems most used on the Ford.—Geo. T. Overose.

While both types of rim have their advantages, we believe you will be satisfied with the solid type. The fact that the rim is in one piece make for strength and the Ford tires are not so large but what

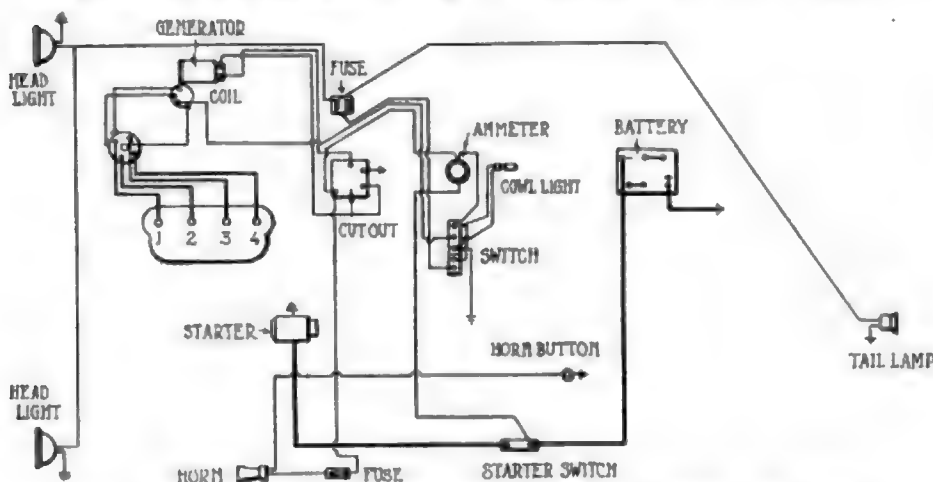


Fig. 4—Diagram showing how to attach ammeter to model 5 Ford car. One terminal is connected to the starter switch and the other to the switch by one wire and the cutout by another

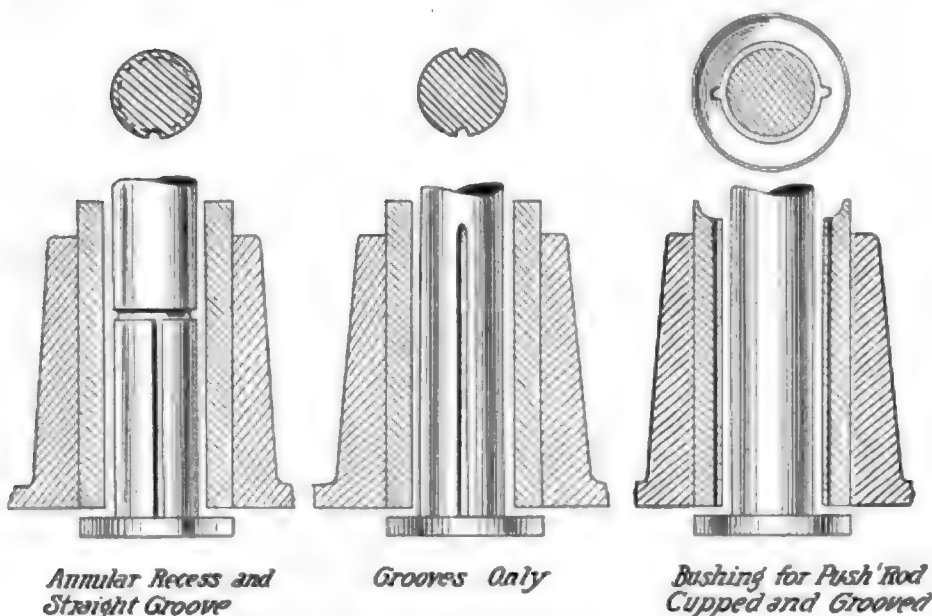


Fig. 5—Method of bushing push rod which has become a sloppy fit

they can be easily put on or taken off. We mean, of course, for you to use the clincher tires. The very fact that the clincher tire is used in the majority of cases on Fords fitted with demountable rims will carry out this fact. The one thing to look out for with demountable rims is to make sure that the rim wedges are drawn up tight, and that each wedge has the same tension. Otherwise the tire will not run straight, resulting in unnecessary wear.

HOW TO GET RACING CAR NOISE Low Rumble Can Be Produced by Special Muffler Described

Los Angeles, Cal.—Editor Motor Age—I am overhauling a four-cylinder T-head National engine. The machine was a special roadster, quite speedy, but I am quite sure should be faster.

1—What means or method is used to bring out the low, distinct rumble in the exhaust of this engine, 5 in. bore by 5 11/16 in. stroke? We have leak tight rings, fine compression and timing perfect, enlarged exhaust pipe with no muffler, but still cannot get that harmonious racing-car sound.

I am shortening the wheelbase. How about a 108 in. wheelbase for this car?

2—What type of rear springs are used in general run of racing cars?

3—What size wire wheels are used generally on racing cars? I want a wheel to fit cord tires that are commonly carried in stock. What about tires 33 by 4 1/2 or 32 by 4 1/2? Of course clincher tires are the kind used. The former wheels were for tires 30 by 4 1/2.

4—How must the car be geared to attain the greatest possible speed?—Walter Young.

1—The low rumble in the exhaust of a racing car is due generally to the design and construction of the engine. As the engine you have is several years old, about the only thing you can do is to magnify the sound by the method shown in Fig. 6. This shows a large sheet steel cylinder A, fitted with a conical-shaped head into which the exhaust pipe is led as shown. The end of the exhaust pipe should be flared, as shown at B. The rear end of the cylinder A is covered with a metal cap into which several holes have been made. We have seen this arrangement used very successfully on a small high-speed engine, the exhaust of which sound-

ed like a high-powered racing car. Many of the racing cars give out a metallic sounding exhaust because the exhaust pipes and headers are made of thin metal. This thin metal will vibrate under the periodic exhaust impulses and set up a peculiar ring of its own. Of course, the thinner the exhaust pipe the better will be its radiating effect.

This wheelbase will be all right for track work.

2—Nearly all of the racing cars use semi-elliptic rear springs.

3—The majority of racing cars are fitted with 32 by 4 1/2 or 34 by 4 1/2 in. tires. These sizes are carried in stock.

4—The correct gear ratio can be found by trial only, that is if the car is to be used for racing. To begin with, you must know how fast your engine is capable of turning over, the size wheels you intend to use and the speed desired of the car. Scientifically-designed racing cars have appeared on tracks from time to time and after several try-outs they were found to have either too low or too high a gear ratio. So you can see the matter of correct gear ratio for the greatest speed is one of experiment. Another thing that must be considered in this case is whether the car is to be used on the road, or solely for track purposes.

Piston Pin Breakage

Waukegan, Iowa.—Editor Motor Age—I purchased a 1913 model M. Chalmers "30" roadster and upon examining the engine, I found

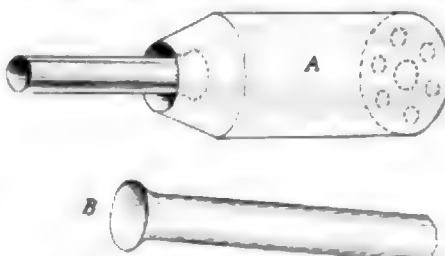


Fig. 6—Noise amplifying exhaust to give raucous sound to small engines

piston pins broken in Nos. 2 and 4 cylinders. I had them replaced by a local repair man. I am overhauling it now and find the piston pin in No. 4 cylinder broken again. The bearings seem to be in perfect condition, and the car has not been driven over 2000 miles since replacing. What does Motor Age suggest is the trouble?—Clifford Law.

Inasmuch as this car is several years old, it may be that the piston pin guides are badly worn or that the new pins fit too closely and do not provide for proper lubrication. It may also be possible that the pistons in these cylinders have become worn to such an extent that they cause a side slap, resulting in breakage of the pins.

RESTA'S PEUGEOT IS FOR SALE Cost \$22,000 to Build, Quoted Price of Owners \$10,000

Fort Morgan, Colo.—Editor Motor Age—Illustrate the different ways in which noted racers hold their steering wheels while racing.

2—Is the new Emerson car being manufactured?

3—What is the bore and stroke used in this car?

4—What was the cost of Dario Resta's Peugeot racing car?

5—Is this car recognized as the fastest car in the world?

6—Where is this car offered for sale, and what is the price?—Frederic Belle.

1—In the group shown in Fig. 10 are photographs taken especially to show how the drivers whose names are given hold their steering wheels.

2—Yes.

3—3 3/4 by 4.

4—According to the Peugeot Auto Import Co., New York, it cost \$22,000 to build this car.

5—No. It is recognized as the fastest competition car with an engine in which the cubic inch piston displacement is less than 300. The Benz cars driven by Oldfield and the late Bob Burman, the Fiat driven by Duray, the Christie and several other cars with engines larger than 300 cu. in. piston displacement have been capable of greater speed. This recognition of the speed of Resta's Peugeot is based on its performance in competition and not on trials for speed records.

6—Peugeot Auto Import Co., 1800 Broadway, New York, by A. G. Kaufmann. The importers are willing to sell the car for \$10,000.

SPEED FROM ALTERED FORD CAR No Definite Estimate Possible—Judged from Others

Rusk, Texas.—Editor Motor Age—I am rebuilding a Ford car according to these specifications: 3/4 in. shaved off of cylinder head to raise compression. Diameter of valve ports directly under valves reamed out about 1/16 in. oversize, leaving about 1/16 in. of valve seat, using regular stock valves. Cam shaft giving longer opening and higher valve lift as sold by D. R. Noonan of Paris, Ill. Iron pistons weighing 1 1/4 lbs. and perfectly balanced. Two double rings at top of piston. Atwater-Kent automatic-type ignition. Itayfield-Ford special carburetor 1 in. Extra large funnel on rear end of regular Ford oil pipe. Regular Ford wheels and tires; Racetype body, fairly streamline in shape, weight about 200 lbs. Three to 1 gear ratio at rear axle.

1—What speed should I expect to make with this on a straightaway?

2—In how many seconds should I accelerate to a speed of 40 m.p.h.?

3—Could I attain this speed quicker with regular stock gearing?

4—Which gear-ratio would be best for racing on a half mile dirt track where turns are somewhat soft?

5—What were the principal causes of cars

falling to finish in the last big Ford races at Chicago?

6—How could these faults best be eliminated?
—Harry H. Bruner.

1—It is hard to say just what speed you might expect from an outfit like this, but judging from what others have done with rebuilt Fords you may expect a speed anywhere from 55 to 60 m.p.h.

2—This depends entirely upon how well your car is tuned up.

3—If your engine picks up quickly, no.

4—The 3 to 1 gear ratio will be all right for fast road work; for track work, ratios as low as 2½ to 1 are used.

5—Overheated engine, broken connecting rods and pistons due to too much lightening and stuck valves.

6—By greater water-carrying capacity, scientific weight reduction in connecting rods instead of hit and miss drilling of holes, by the use of light pistons especially designed and again by proper cooling and good lubrication to keep valves from sticking.

DO NOT LENGTHEN ENGINE STROKE Ford Cylinders Can Be Rebored to 4 in. With Safety.

St. Louis, Mo.—Editor *MOTOR AGE*—I am planning to convert my Ford into a racer. To what size do you consider it safe and practicable to enlarge the Ford cylinders, and will this size be suitable for one of the standard sizes of Lynite pistons.

2—Is it advisable to lengthen the stroke of the Ford engine without lengthening the cylinder block?

3—Is there a crankshaft of some other make of machine of a longer stroke which could be fitted into the Ford engine?

4—Would it be advisable to counterbalance a Ford crankshaft?

5—What size do you consider advisable or customary for larger valves, and will this size correspond with a standard size of tungsten valve?

6—Where can I get the valves?

7—Is it advisable aside from the labor, and provided the job is well done, to employ semi-elliptic underslung springs all around for a Ford racer?—A. W. Meston.

1—You can safely bore the Ford cylinders to 4 in. and this will accommodate the pistons you speak of.

2—Better leave the stroke as it is. It is quite an undertaking to make a radical change in an engine and the results do not, in most cases, warrant the expense.

3—We know of no crankshaft that could be fitted to the Ford engine. One could, perhaps, be made to order but the price would be prohibitive.

4—Yes.

5—The valve ports can be reamed out to accommodate a 1¼-in. valve and this size can be had in tungsten valves.

6—Concerns making these valves, as well as those making light pistons, etc., will be found in the advertising columns of *MOTOR AGE*.

7—Other things being equal, yes. We have noticed, however, that most of the Ford cars built for high-speed work keep the springing as it is, excepting that the spring perches are lowered.

Ammeter on 1915 Hercules

Milwaukee, Wis.—Editor *MOTOR AGE*—Give instructions for wiring an ammeter on a 1915 Hercules. This has a Federal starter and motor combined.—E. J. Stacey.

As this machine is equipped with the Federal single-unit starter, having only two

Inquiries Received and Communications Answered

George W. Griffith.... Martinsville, Va.
Verne Cole..... Rockford, Ill.
W. H. Beede..... Vermillion, S. D.
A. B. Thompson..... Louisville, Ky.
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Fred Weiss..... Grand Mound, Iowa
Harold D. Crocker..... South Bend, Ind.
George T. Oveross..... St. Peter, Mont.
Walter Young..... Los Angeles, Cal.
Clifford Law..... Washta, Iowa
A. W. Meston..... St. Louis, Mo.
Harry H. Bruner..... Rusk, Tex.
R. C. Squires..... Evansville, Ind.
W. D. Tucker..... Hartford, Conn.
C. A. Kerna..... Allene, Okla.
L. B. Monahan..... South Sioux City, Iowa
Frederic Belle..... Fort Morgan, Col.
E. J. Stacey..... Milfin, Wis.

leads to the battery, any indicating device put in the circuit must take both the starting and generating load. For this reason we recommend an indicator such as used by the Franklin on the Dyneto single-unit starter. However, if it is desired to use an ammeter, it will be necessary to have it sufficiently large to take the discharge of about 75 amp., while a capacity of 20 amp. charge will be more than sufficient. Any indicating instrument installed in the circuit may be placed in the main circuit of the battery, it of course being understood that a large cable will be used to complete the circuit to and from the instrument.

The Roller Smith Co., 233 Broadway, New York, make a suitable instrument.

Use No. 2 cable for connection.

WHAT COUNTERBALANCING MEANS One Can Assume that All Modern Engines Are Balanced

South Sioux City, Iowa—Editor *MOTOR AGE*—Would a Weldely Twelve 2½ by 5 engine be too powerful for use on a Paige Stratford model instead of the Continental used?

2—What sizes besides the super-six have fully counterbalanced crankshafts? What twelves if any have fully counterbalanced crankshafts?—L. B. Monahan.

1—Not too powerful for the rest of the chassis.

2—In the first place there is no such thing as a fully counterbalanced crankshaft. The reason for this is that regardless of design, it is impossible to get the counterweights in the plane of rotation of the connecting rod. If the weights were so carried there would be no pathway through which the lower part of the rod would travel. Therefore the nearest engineers can come is to use a system by means of which the distortion factors will be reduced to a minimum. The Fekete principle as used on the Hudson car is recognized as probably the most complete system of mathematical balance that is in commercial use to-day.

On the other hand, there are a number of cars employing balance systems which are not derived from mathematical principles so much as from the law of trial and error. As an example of this we might mention the crankshaft used on the small four employed in the Woods gasoline-electric car. This is the Le Roi unit which runs continuously at speeds close to 3000 r.p.m. In this crankshaft the counterweights are probably closer to the plane of connecting-rod location than in any other shaft. The balance of these shafts is arrived at through a counterweight system which is checked by rotating a shaft while suspended from a flexible cable. There are also shafts such as the Wyman & Gordon, and those employing the curved-cheek principle which have worked out quite satisfactorily for speeds up to 2800 r.p.m. Thus you see that the question of counterbalancing is only relative and depends upon the speed of the engine. The more rapid the rotation the greater the distorting influences and hence the nearer perfection it is necessary to go in the way of counterbalancing.

An engine might have a shaft which is perfectly satisfactory at 2000 r.p.m. but which may be entirely unsatisfactory at 2800 r.p.m. and yet, owing to gear re-

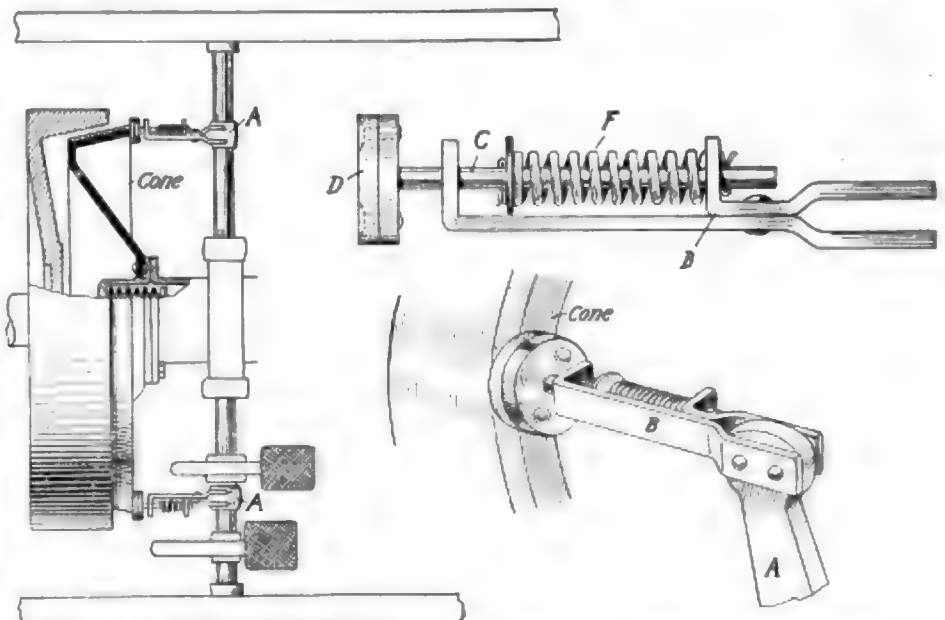


Fig. 7—Hastily constructed brake to prevent cone clutch from spinning when released

duction, etc., this engine might be considered in satisfactory running balance. In this day of refinement in engine design it can be truthfully assumed that every engine manufacturer has a shaft which he considers in complete running balance for the speed at which his engine travels, and therefore you could assume that every six and every twelve is in complete commercial running balance.

Regarding fully counterbalanced shafts this, as has been pointed out, is commercially impossible. If you refer only to the Fekete principle, this is difficult to answer because we do not know what is going on in every laboratory. We do know, however, that no other cars are at present put on the market with it. The question of balancing is not a new one, as it has been with us ever since steam engines first began to be operated. It has only assumed that prominence which makes it a subject of somewhat hysterical inquiry since engine speeds ran up to 3000 r.p.m. or 2000 ft. per min. piston speed.

HOW TO CONSTRUCT CLUTCH BRAKE

Reason Why Engine of 1913 Buick Car Vibrates

Evansville, Ind.—Editor *MOTOR AGE*—In my model C-24 Buick what is the cause and remedy for the extreme vibration that takes place when accelerating from 5 to 20 m.p.h.? The car is in perfect condition and always has been subject to this vibration. By retarding the spark practically all the way the vibration is eliminated, but that kills the power and makes very slow acceleration. Other four-cylinder cars do not have this vibration even with advanced spark, so there must be something at fault in the design of this engine. The universal has to carry the weight of the drive shaft and housing. Would it not be better if this weight was supported in some other manner, as there seems to be excessive wear between the drive shaft and universal?

Can you suggest any way to attach a brake to the clutch cone that enables quicker gear shifting?—R. C. Squires.

The vibration you speak of is to some extent characteristic of this model Buick which was brought out in 1913. It is not due to the design of the engine but to the way in which the latter is mounted upon the frame. The engine is carried in a sub-frame which in turn is bolted to the frame of the car, and it was this method of placing the engine which resulted in some of these cars setting up vibrations when accelerating. So far as we know the company never had any trouble from undue wear between the drive shaft and universal.

A type of clutch brake we have seen used to good advantage, not on this particular car, however, is shown in Fig. 7, fastened to the clutch pedal shaft in the positions shown. Two pieces of strap iron B are bent to fit arms A and riveted together, after having first drilled holes in them for the stem C. The latter is fitted with a metal head to which is riveted a disk of leather D. A coil spring is slipped over C and cotter pins and washers inserted as shown. The two brakes should be mounted at diametrically opposite points of the clutch cone, and so placed that they will point slightly upward when the clutch

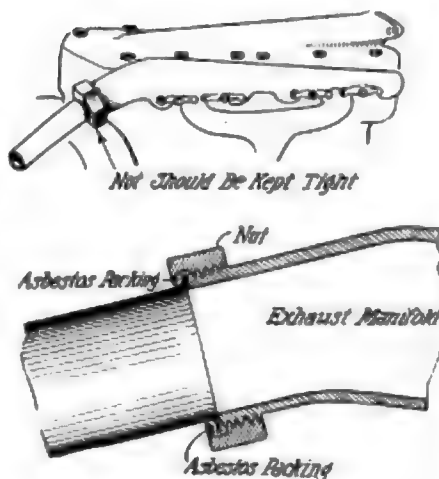


Fig. 8—Showing conventional method of connecting exhaust pipe to manifold. The packing must be tight to prevent leakage and disagreeable noise

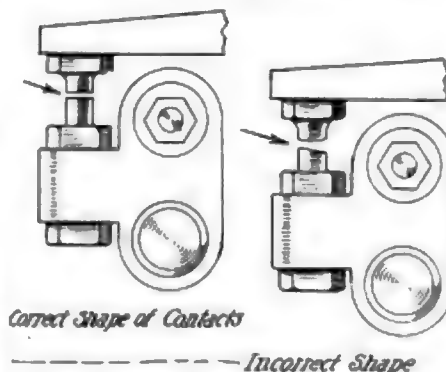


Fig. 9—Correct and incorrect shapes for magneto contact points

is in engagement. Then when the clutch is thrown out, the brakes will gradually take a horizontal position and meet the cone squarely. Further depression of the clutch pedal will cause the spindle C to be moved against the spring F, taking off the strain on the arm A and pieces B. At the same time the leather disks D will exert pressure against the cone and slow it down. It can be modified, no doubt, to fit most cars using a cone clutch. The arms A are to shift the gears more readily.

THE METHOD OF SOLDERING BRASS

Commercial Sulphuric Ether Does Not Injure Metal

Allene, Okla.—Editor *MOTOR AGE*—How can I make solder stick to brass and metal and what will I need for the work?

2—I have a Ford car and there is a grinding sound in the gearset. What is the cause and how can I remedy it?

3—How can I melt rubber so I can pour it?

4—Is commercial sulphuric ether injurious to metal and how?

5—There is a knock in the exhaust that is not caused by advancing the spark. What is the cause and how can I remedy it?—C. J. Kerns.

1—A solution of sal ammoniac and borax makes a good soldering fluid. Sal ammoniac—muriate of ammonia—is the natural flux for copper, and, owing to the presence of that metal in brass, it works well in fluxing that metal for soldering. There are many kinds of soldering sticks on the market which you can use for the purpose. Besides the solution or soldering stick you

will need a scraper or emery cloth to clean the parts to be soldered, and a copper bit. If the work to be soldered is very large the bit should be big enough so that it will retain the heat. Remember to have the bit hot enough when using it, as good work cannot be done with one that is too cool.

2—Grinding noises in the gearset are generally caused by gears that have become worn. You do not state whether the noise is heard when the car is on the road, or when it is standing with the engine running. It may be that some foreign matter has gotten under the bands. We would suggest that you remove the gearset cover and inspect the gears as well as the bands.

3—We know of no way to melt rubber so it will pour readily. Pure rubber becomes sticky when heated, but will not melt. The only thing you can do perhaps, is to thin it down with benzine or naphtha and make a solution of it like the common rubber cement. Rubber can be heated to make it pliable whereupon it can be molded into various shapes, but the actual pouring of it is doubtful.

4—No. Commercial sulphuric ether is made by treating alcohol with sulphuric acid.

5—The knock is probably caused by the locknut on the exhaust pipe and manifold having become loose. If this nut is not drawn up tight the end of the exhaust pipe will strike the manifold and very often produces a knock. The proper way to make this joint is shown in Fig. 8.

A RULE TO TIME MOST MAGNETOS

Method of Cleaning Circuit Breaker—Misfiring Cause

Hartford, Conn.—Editor *MOTOR AGE*—Give me a rule that will time all magnetos.

2—Give me a rule that applies to all carburetors in adjusting the float below the spray nozzle.

3—What causes carburetor to catch fire and give remedy?

4—How is the circuit breaker cleaned?

5—What causes misfiring when spark plugs are all right in magneto and battery ignition?

6—How are push rod bearings remedied when they are found to have side way play?

7—How do you test for an even compression on all cylinders?

8—How is a leaky metal float and water-logged cork float mended?—W. D. Tucker.

1—Practically all high-tension magnetos are so arranged that the spark takes place the instant the breaker points separate. To time a magneto of this type for a four-cylinder engine you proceed as follows: Turn the engine over until cylinder No. 1, which is the one nearest the radiator, is on the compression stroke. You can tell when the latter cylinder is on this stroke by observing the exhaust valve in cylinder No. 4 which will be lifted. Remove the cover of the distributor and turn the armature of the magneto so that the distributor arm will be on segment 1. This is the segment connected to the plug in cylinder No. 1. Place the contact breaker box in retard position and revolve the armature with the hand until the points barely begin to open, then push the armature back just a little.



The Motor Car Repair Shop



Grind the Valves—Save Gasoline

ILL-FITTING valves mean high gasoline consumption and low power output. Valves are not ground often enough. This seems to be due to a sort of a reverence owners hold for the operation. They seem to think it is a task requiring skill and experience. In reality it requires more patience than anything else. Patience, painstaking and perseverance, will grind valves to a perfect seat.

Carbon deposits itself between the valve and valve seat. The valve seat becomes pitted or warped from heat. When such conditions exist the valve allows gas to slip through, as shown in Fig. 1. If the intake valve is leaky there will be a flow of gas to the cylinders at each downstroke of the piston instead of on every other downstroke, and this means high gasoline consumption. Should the exhaust valve be carbonized the compression escapes with resultant weak explosion and more loss of unburned gases.

In determining whether or not valves are seating properly, turn the engine over slowly until resistance is felt. This should be done with each cylinder, and should there be little resistance it is evident that there is a loss of compression. This is not proof of the pudding, however. Insufficient clearance between the valve stem and push rod, spark plug leaks, broken piston rings, etc., will have the same effect. These should all be examined before proceeding to grind the valves.

Get Material First

The first step in grinding valves is to get the material together for the job. The usual grinding compounds are mixtures of very fine emery dust and oil. Although a good seat may be made with one grade of grinding compound, it will speed up matters to have a coarse and fine grinding agent on hand. If no special valve-grinding tool is at hand, a screwdriver or ordinary brace is suitable. The only other requisite are some clean rags and some clean gasoline.

Before the grinding operation is begun the spring which seats the valve when the engine is functioning should be removed, together with the cylinder plug above the valve, if the engine is of the side-valve, non-detachable head type, or if it be of the overhead-valve or removable-head type it will, of course, be necessary to remove the head. The valve should be taken out, and if there is any chalky deposit on the face it should be scraped off with a knife. When doing this care should be taken not to scratch the metal. If a non-detachable-head engine, the entrance to the cylinder proper below the valve should be plugged

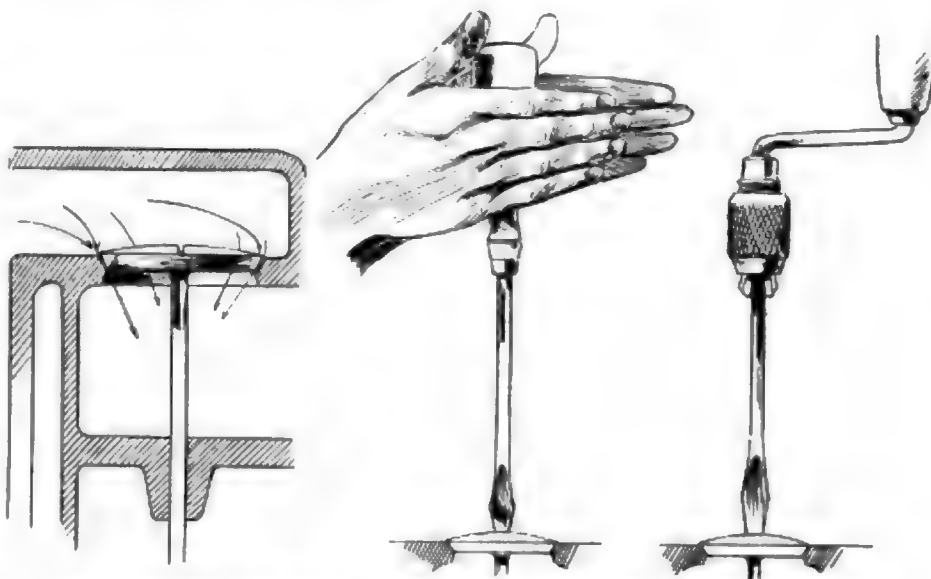


Fig. 1—The view at the left is to show how compression leaks through valves which are leaky. The other two views show two tools to use in grinding valves, and incidentally a method of holding the screwdriver in the hands

with a rag to keep the grinding compound out of the cylinders. Do not use cotton waste in this grinding process.

If you are mixing the compound yourself, put some of the coarse emery into lubricating oil in sufficient quantities so that it will stir up into a mixture about the consistency of library paste. It is easier to buy the compound from a supply store already mixed. The cost is slight because only a small amount is required. This mixture is spread lightly over the face of the valve, using a saw blade, knife or flat stick of wood. The valve is then slipped into place.

Grinding is accomplished best by turning the valve back and forth on the seat about half a revolution a little farther in one direction than in the other, and then turning the valve half about and proceeding with the operation again. All valves have a groove in the top for insertion of the screwdriver. When a screwdriver is used the handle should be placed between the palms of the hands, as shown in Fig. 1. This does not permit the valve to make a complete circle. The valve should not be pressed hard against the seat; just enough to bring the two parts in contact.

After about every dozen turns the valve should be turned half around. After grinding with the coarse mixture for about 2 min. the valve should be taken out and washed thoroughly in clean gasoline. The seat should also be washed with gasoline. If the face of the valve and the seat within

the cylinder casting are shiny all around, with no little black spots showing on the surface, the grinding is completed.

But should there appear on the face or seat a number of these blotches, the grinding should be continued with the fine emery mixture. Frequent examination, probably at intervals of 1 min., will tell one when the job is done. After each valve has been ground, remove the emery paste very thoroughly from every part upon which it may have become deposited. The importance of this cannot be overestimated. A very small quantity of the grinding compound, if it were to work into some bearing surface, would cause unnecessary wear.

A safe way to do this in one-piece cylinder engines is to pour a half-tumbler of gasoline into each valve chamber and apply compressed air. If no air is at hand a tire pump can be used to spray the gasoline. A clean cloth should be used to wipe the inside of the valve chamber.

Buick Oil Leak Plugged

Ladoga, Ind.—Editor MOTOR AGE—I noticed many complaints in MOTOR AGE concerning the oil leaking from the timing gears of Buicks. We had the same trouble with a D-6-45. After removing the radiator we noticed the oil leaking from around the fan pulley. We disengaged the pulley and placed a small felt washer around the pulley shaft. We haven't had trouble with the oil in the 4000 miles that we have driven since. —George F. Frantz.

MOTOR AGE

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ANNOUNCEMENT

Do not fail to read the next installment of "Trailing a Trailer into the Rockies" if you are at all interested in this new method of carrying baggage. The writer takes up the problems a trailer is likely to give and solves them through his own experiences.

"NORMA" BALL BEARINGS

(PATENTED)



A trouble-proof car may be an ideal impossible to be realized. It can be approached, however, if every care is exercised to make every detail that enters into the construction and equipment of that car, as nearly trouble-proof as possible. This emphasizes the important part that so-called minor details play in the performance of any car. Manufacturers of high-grade magnetos and lighting generators have found by experience that "NORMA" Bearings give them dependable bearing service—and they have standardized on "NORMA" Bearings. Makers of cars of the better class have learned by experience that the electrical accessories that give them the most dependable service have "NORMA" Bearings—and they have standardized on these magnetos and lighting generators.

**Be Sure—see that your
Electrical Accessories
Are "NORMA" Equipped**



THE NORMA COMPANY OF AMERICA

1790 BROADWAY

NEW YORK

Ball, Roller, Thrust and Combination Bearings

Fender Law Is Illegal

Circuit Court Judge Rules Chicago Ordinance Is Unconstitutional

Fight by Truck Owners Dates Back Two Years

CHICAGO, May 14—Chicago's truck fender ordinance today was declared unconstitutional and discriminatory by Judge Fred A. Smith in the circuit court of Cook county. This closes the first chapter of a two-year record of fight by the truck owners in the city against a flagrant attempt to capitalize for private gain the efforts of the city to safeguard pedestrians.

The history of the truck-fender ordinance in this city dates from July, 1916, when the council passed a measure requiring that all commercial vehicles over 1500 lb. capacity, and not carrying passengers, must be fitted with fenders approved by a city committee. Six months were given in which to test out fenders which local concerns were making an effort to have endorsed by the police department. The chief of police refused to give his endorsement to the devices submitted. The truck owners and their organization, the Motor Truck Owners' Association, found it impossible to purchase fenders, and the association believed that the fender makers wanted the city endorsement in order to interest capital to manufacture.

Enforcement of the ordinance was deferred from time to time, and on March 16 last a temporary injunction was granted against the enforcement of the ordinance by Judge Smith. At the final hearing today, Judge Smith ruled that inasmuch as the ordinance does not include the lighter commercial cars, and those designed to carry passengers, the ordinance is discriminatory and therefore, illegal. It is anticipated that the interests which have been behind the ordinance may attempt to have it amended.

PRICE INCREASES

Pontiac, Mich., May 11—The Monroe Motor Co. has increased the price of its car to \$1,095.

Detroit, Mich., May 11—Effective May 14, the King cars will cost as follows: Roadster, \$1,585; touring car, \$1,650; four-some, \$1,700; sedan, \$2,300. Wire wheels are \$100 additional.

MAKER	MODEL	OLD PRICE	NEW PRICE
Dixie	5-pas.	\$ 845	\$ 595
Dixie	4-pas. roadster	845	595
Dixie	6-pas. sedan	1,275	1,295
Dorris	2-ton truck	2,185	2,285

DUESENBERG TO BUILD PLANT

New York, May 14—The Duesenberg Motors Corp. has filed plans for the con-

struction of a plant in Elizabeth, N. J., for the manufacture of airplane engines for the Government. The plant will cost \$200,000. The company has been so rushed with orders that it has been forced to seek larger quarters. It has been occupying temporarily a plant at Edgewater. It is believed that the new plant will be the largest in the East, being one story, and employing more than 1000 men. The company has bought 9½ acres of land in Elizabeth.

MATHER HEADS NEW SERVICE

Washington, D. C. May 12—Stephen T. Mather, Chicago, has been appointed director of the National Park service, recently provided by Congress. Mr. Mather was assistant to the Secretary of the Interior, in which office he had supervision of the National Parks.

G. N. THURBER DIES

New York, May 15—G. N. Thurber, vice-president of the Isotta-Fraschini Motors Co., is dead from a long-standing disease of the heart. For many months he had been suffering acutely but stuck to his work. A short time ago he was forced to give up and take a rest.

RECEIVER FOR BEN HUR

Cleveland, Ohio, May 14—The Ben Hur Motor Car Co., capital, \$1,000,000, incorporated in Delaware, with its factories and offices at Willoughby, Ohio, is in the hands of a receiver. Charles P. Moore, of Cleveland, has been appointed receiver. Inability of the company to obtain materials is said to have hampered its activities.

JORDAN PRODUCTION TO DATE

Cleveland, Ohio, May 11—The Jordan Motor Car Co. has shipped to date \$1,700,000 worth of motor cars, and the production for the coming year is to be increased. In a statement to dealers, Edward S. Jordan, president, says on the first 1000 Jordan cars delivered to owners the total replacements from the factory amounted to \$387.50. This included no replacements of parts of minor equipment.

NEW STEERING WHEEL

Wichita, Kan., May 11—The Fold-O-Lock Steering Wheel Co. is being organized with a capital of \$250,000. C. A. Hagberg is president and general manager. The other officers are Carl L. Windberg, vice-president and sales manager, and F. L. Fraser, secretary and treasurer. The new wheel locks the car by folding. It is equipped with a Yale lock. Wheels for Ford cars will sell for \$10, and for larger cars \$15. A factory will be built. The radiator cover which the company will make is one which the driver can reach and adjust without leaving his seat.

220 Used Cars Sold

Sales at Chicago Show Total \$181,345 for Nine-Day Exhibition

Successful Results Presage Continuance Twice Each Year

CHICAGO, May 14—Marketing 220 used cars in nine days at an average price of \$824.30 has driven home the conclusion of Chicago dealers to conduct a used car show twice a year. When the closing hour came last night, total sales for the first used car show ever held in Chicago were \$181,345. Never before has a show for used cars been held on the scale of that just completed. Everything ran as smoothly as the big national shows, principally because the show was run by an efficient show manager. There was no hit-or-miss policy about the Chicago used car show. The full co-operation of the Chicago trade was given, crystallized through the work of the show management, and there were no complaints heard throughout the exhibition.

Approximately 83,000 visited the show, 7353 of whom paid admission. It was not necessarily a bargain-hunting crowd, for an average price of \$824 per car does not smack of getting cars for a song. The highest-priced car sold brought \$4,300 and the lowest \$275. Here is how the sales averaged each day:

DATE	CARS	SALES
May 5.....	15	\$ 12,500
May 6.....	35	34,335
May 7.....	26	22,775
May 8.....	21	15,945
May 9.....	26	24,080
May 10.....	24	21,115
May 11.....	19	16,150
May 12.....	17	13,170
May 13.....	36	21,215

Total220 \$181,345

Tagging the car with the lowest cash price for which it would be sold, together with its pedigree as determined by an expert technical committee, proved popular with the buyers. They felt that if they bought a car they got it at a price that was the same as anyone else would have had to pay. Every dealer exhibiting voted the show a success and went to make it a semi-annual event.

JOFFRE TELLS OF BOILLET

Indianapolis, Ind., May 14—While Joffre was a visitor here he told of Boillet's death. On the return trip to the Union Station, B. M. Wylie, who had the honor of driving the National car carrying Joffre and Viviani, could not resist inquiring about his old friend Boillet and Goux, the famous French race drivers who were the speedway heroes here in 1913 and 1914. Via the interpreter, Joffre said that at the start of the war Boillet, who was a French army

officer reserve, acted as his driver and was later made a captain in the aviation service. The interpreter also knew Boillet and stated that he was indeed a hero and came to his death during an air battle in which Boillet was successful in bringing down three German airplanes. Joffre in person accorded Boillet military honors in recognition of his heroic deeds.

Boillet and Goux, representing France, were under the management of the National factory while in the country.

INDIANAPOLIS SPEEDWAY REFUSED

Indianapolis, Ind., May 14—James A. Allison, secretary-treasurer of the Indianapolis speedway, received a telegram yesterday from the aerial division of the United States war department stating that the speedway which recently was offered to the government as a site for an aviation training school had not been considered in the first three fields accepted, and that the Indianapolis speedway was released from all obligations to the government. Mr. Allison said he has not been informed what the objections to the grounds were and that he has no plans in view for use of the track at present.

HOWARD WILCOX MARRIES

Indianapolis, Ind., May 14—Howard Wilcox, race driver, and Miss Katherine Dugan of this city were married May 9. Mr. and Mrs. Wilcox left Indianapolis in a race car on their honeymoon, but the trip was cut short at Anderson, Ind., where the groom was arrested, fined \$35 and placed in jail on the charge of speeding. After Wilcox had remained in jail for an hour he was called before the mayor of the city, who explained that his arrest was a joke, arranged by his friends. The fine of \$35 was remitted to Mrs. Wilcox, and after the race driver had been host to a dinner for a score of friends, they were permitted to proceed.

OLDFIELD SPECIAL JUNE 15

Chicago, May 11—Barney Oldfield, who starts his sixteenth year as a motor car race driver this spring, will make his first appearance at the wheel of his new speed creation, the Oldfield Special, in the third annual Auto Derby to be run on the Chicago speedway June 16.

The Oldfield Special, a description of which appeared in *MOTOR AGE* recently, now is nearing completion on the Pacific coast. It is so constructed that it conceals both the driver and the mechanic from view and, being thickly upholstered, protects them if the car turns over.

THREE RACERS REINSTATED

New York, May 12—Eddie Hearne, Louis LeCoeq and O. H. Kirkpatrick were restored to good standing with the Contest Board of the American Automobile Association at a recent meeting.

Fiats to Stay at Home

Indianapolis Race Abandoned; Racers Are Sent to Storerooms

Italian Cars Ready for Shipment When Word Came

TURIN, Italy, May 1—Securing entries for American motor races during the war period is a difficult business; building and preparing cars for these races is well nigh impossible, except for the most powerful organizations. It was in January that W. F. Bradley, *MOTOR AGE* war correspondent in Europe, acting on behalf of the Indianapolis Motor Speedway Co., succeeded in interesting the directors of the Fiat Co. in American races and obtaining from it a promise that two cars would be sent across the Atlantic for the 1917 campaign.

Innumerable difficulties had to be surmounted in order to complete the modified 1914 Grand Prix races. To make matters worse there were heavy snowfalls in northern Italy with the result that the cars had to be sent a considerable distance to the south in order to find roads safe for speeds of 100 miles an hour. Before the cars could be exported and before the drivers and mechanics could secure permission to leave the country a special government permit had to be obtained.

Permit was Given

After one of the most influential officials of the company had spent a week in Rome, the government decided that it would be in the industrial interests of Italy to allow two drivers and four mechanics to leave the country. When the permits had been obtained, and the cars had completed their tests, Germany put her submarine menace into effect, and for a time trans-Atlantic sailings were suspended. The railroads in Italy are as congested as elsewhere, with the result that it was doubtful if the cars could be got to the port in time for the Indianapolis race. This difficulty was overcome by a decision to load the boxed cars on automobile trucks and send them to Genoa by road. They were scheduled to leave this port end of March, and arrive in New York April 20 to 22. The drivers and mechanics booked passages on one of the French line steamers sailing from Bordeaux about April 15.

Having overcome so many difficulties, more than ordinary interested attended the dispatch of the cars from the factory to Genoa. Thus, in addition to the customs officers who attended to seal the boxes after having verified that the cars were actually racing machines, and not trucks, touring cars or war material, there were present all the high military authorities of the Turin garrison, the American consul, the heads of the various Fiat departments,

and the two race drivers who were to represent Italy in the American campaign. Good wishes and congratulations were being passed around when a message boy approached Engineer Marchesi with a cable. He opened it and read:

"Indianapolis race abandoned.—Bradley."

There were a few minutes of consternation. The racing engineer looked to the chairman of the board of directors, the chairman appealed to the army officers, who shrugged their shoulders in a confused manner. Chairman Agnelli soon rapped out his decision: "We are out of this game."

WHITE RESIGNS FROM CADILLAC

Detroit, May 14—D. McCall White, chief engineer of the Cadillac Motor Car Co., has resigned. It has been reported that Mr. White has designed an airplane engine in which the government is interested and that this is the cause for his resignation. Mr. White was chief engineer of the Napier Motor Car Co of England prior to his connection with the Cadillac company.

MORE ENTRIES FOR CINCINNATI

Cincinnati, Ohio, May 12—Additions to the list of entries for the Decoration Day race on the Cincinnati speedway since last week's issue of *MOTOR AGE*, include Eddie Hearne, Duesenberg; Pete Henderson, Mercer; Walter Haynes, Mercer; Joe Thomas, Mercer; Louis Fontaine, Mercedes; two Duesenberg Specials entered by F. S. Duesenberg, drivers not named; one car, unnamed, entered by the De Palma Mfg. Co., and Billy Taylor, winner at Uniontown last Thursday, Stutz Special.

SPEEDWAY TO GROW TUBERS

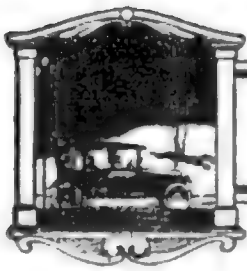
New York, May 14—The big acreage circled by the 2-mile track at the Sheepshead Bay Speedway will soon be planted with potatoes. This plan was made known today by Harry S. Harkness, president of the Sheepshead Bay Speedway Corp., who recently acquired possession of the property.

PATTERSON BREAKS RECORD

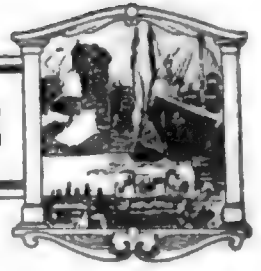
Santa Rosa, Cal., May 13—A. H. Patterson, driving a Hudson, won the first annual rose carnival classic here to-day with a time for the 100 miles of 96 min. 25 sec., breaking the track record. Bolden, in a Duesenberg, was second. Price, in a Duesenberg, was third. B. C. Durant, driving Earl Cooper's old Stutz, led for twenty-eight laps but was forced to drop out on account of magneto trouble.

UNIONTOWN PLANS NEXT EVENT

Uniontown, Pa., May 9—The Uniontown speedway officials are planning a series of local events for May 30, including a 112½-mile race for dealers and two other local events at 11¼ miles. There will be special exhibition event with a handicap race to end the day.



EDITORIAL PERSPECTIVES



Taxing Education

THE proposed changes in the second-class postage arrangements, which is a part of the war revenue measure will increase the cost of mailing business papers such as MOTOR AGE 300 per cent. This means that MOTOR AGE readers, like the readers of all other business publications, may have to help bear this increased cost. It means also that many of the weaker papers may not be able to survive the added burden.

BUSINESS periodicals such as MOTOR AGE are an essential part of any industry. They are as much a part of the industry as the organizations and societies of the manufacturing, engineering, merchandising and other departments. The United States government admits this; the government looks to the business papers for facts concerning the industries they represent and considers them a part of their respective industries. By injuring the national character of the business papers, as the

proposed zone system of postage rates will do, the other industries also are injured. Each business needs its periodicals.

BUSINESS papers reach approximately 5,000,000 readers each week. This represents one out of sixteen of the adult population of the country, including males and females. From a population of 105,000,000 you have to subtract 30,000,000 for children under twelve who are not readers. These figures show what a necessity the business paper is in every industry. These figures show how entirely the various industries depend on the business papers for the dissemination of information concerning them. It is through the business paper that the men of the industry keep in touch with the different ends of the industry. Leaders in all industries admit this. They also admit that the business paper is a part of their industry; in fact, it is an institution in the industry the same as the factory, the dealer, the controlling organization, the society, etc.

A Patriotic Protest

ANNOUNCEMENTS in some of the daily papers to the effect that the motor car industry is on the verge of a collapse on account of the alleged plans of the United States government to commandeer the outputs of the steel mills and other metal working industries, as well as the proposed war tax of 5 per cent on the retail selling price of the car, are not well founded. It is doubtful if there will be any very general closing of factories or serious curtailment of output, immediately at least, on account of the government's need of material.

THE proposed war tax, however, is a most serious consideration with the car manufacturer. As was brought out last week, the Ways and Means Committee of Congress has decided that one of the revenue producing means for the \$7,000,000,000 war fund is to be a tax of \$5 on each \$100 of the list price of a car, whether it be for pleasure or commercial purposes, and in addition, a similar tax of 5 per cent is levied upon tires and tubes.

IT is not patriotic to submit without a protest to ill-advised taxation which taxes the processes of an industry to which the government looks for assistance in successful carrying on of the war, and by such taxation injures and cripples it instead of keeping it in a healthy state. The healthier the motor car industry is, the greater war revenue will it pay the government. The motor car, truck and motorcycle industries are not unpatriotic in opposing the 5 per cent tax; they are not exempt from the taxes which fall on kindred industries and do not object to them. They will pay them with willingness; but in objecting to the 5 per cent tax they are objecting to a discriminating tax on their industries alone. Motors have become one of the necessities of war, and the motor car industry is giving freely of its services and stands ready to give more. The Ways and Means Committee does not propose to place a tax of this nature on freight transportation by railroads. It is no more logical to tax freight transportation over country highways or city streets.

Used Car Show Success

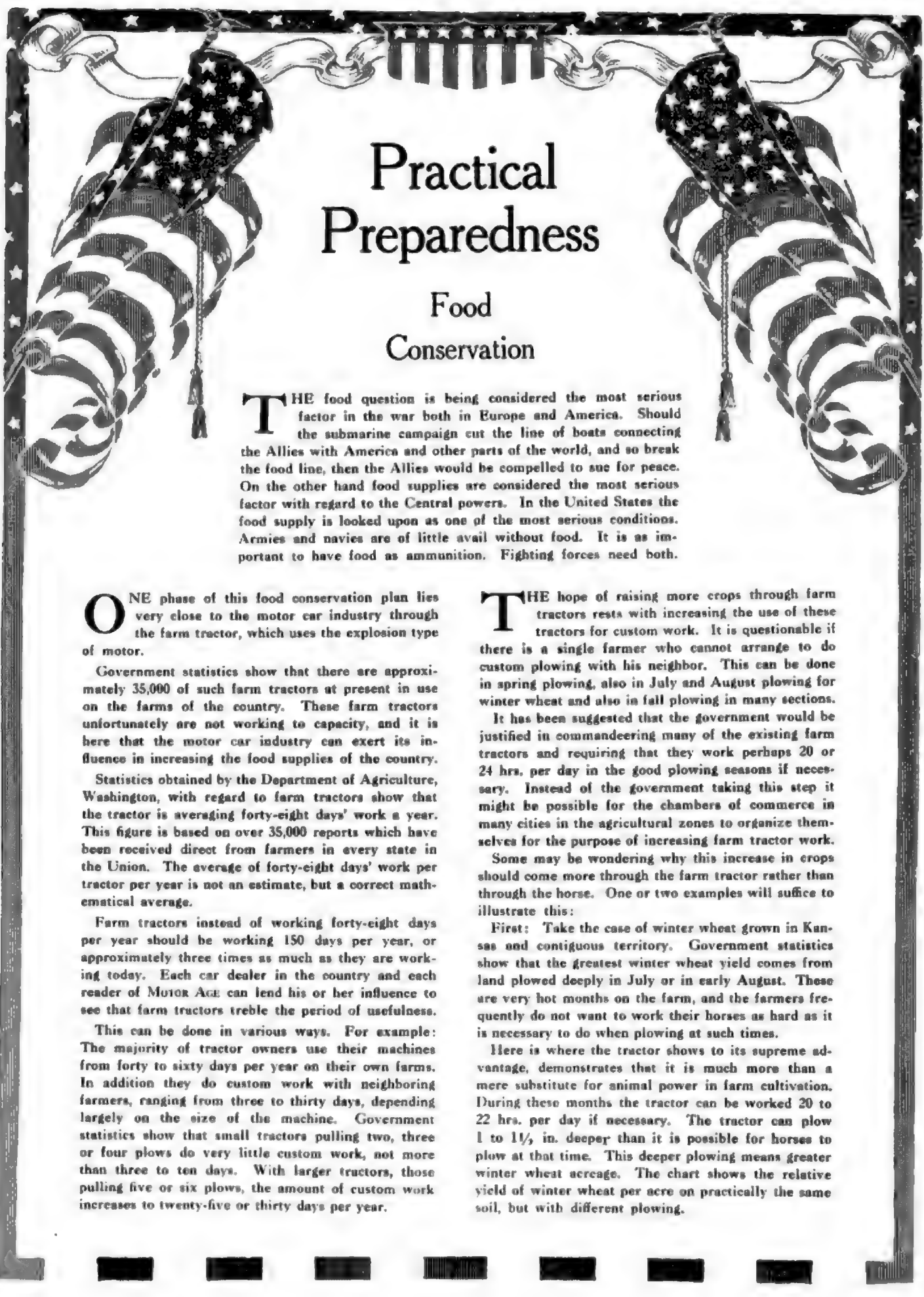
IN the Chicago used car show results are to be found the elements that make for the successful conduct of such an exhibition. Used car shows have not passed beyond the experimental stage, or at least there are many things which must be learned by motor car dealers if they are to make a success of such a method of disposing of used cars taken in part payment for new cars. That there is a market for used cars goes without saying, but selling them at a profit, even of \$10 on a car, in the majority of cases is a problem which calls for a master. Out of Chicago's show, the largest so far ever held, comes these elemental factors that are necessary to successful used car shows:

FIRST—It is most essential that a competent showman handle the details of management. If you need your teeth repaired you call on a dentist—not a physician. If you find the water pipes in your house leaking you call a plumber—not a carpenter. If the dealers of a city plan a used car show they need and must get a competent show manager. They should not attempt to put a man in charge who knows little, if anything, of show management. The secretary of their association

may be a good man, know the trade and be a man of initiative but he cannot know the inside of big show executive work. It is a job for an executive, and a good one, if the show is to be a success.

SECOND—Appraising cars by a competent committee and marking the sale price of every car in plain figures from which there is no deviation, gains the confidence of the prospective buyers. He feels certain that he is buying the particular car he purchases for the same money that anyone else would have bought it.

BOTH of these factors were put to test at the Chicago show and everything moved like clockwork from the opening day until the closing hour. Every exhibit was out of the Coliseum 65 min. after the show closed, which speaks for good executive work. Nine days saw 220 cars sold for \$181,345, an average of \$824.30 per car. Over 7000 persons paid admissions which, with the 75,000 who were given tickets, put the total attendance over \$2,000.



Practical Preparedness

Food Conservation

THE food question is being considered the most serious factor in the war both in Europe and America. Should the submarine campaign cut the line of boats connecting the Allies with America and other parts of the world, and so break the food line, then the Allies would be compelled to sue for peace. On the other hand food supplies are considered the most serious factor with regard to the Central powers. In the United States the food supply is looked upon as one of the most serious conditions. Armies and navies are of little avail without food. It is as important to have food as ammunition. Fighting forces need both.

ONE phase of this food conservation plan lies very close to the motor car industry through the farm tractor, which uses the explosion type of motor.

Government statistics show that there are approximately 35,000 of such farm tractors at present in use on the farms of the country. These farm tractors unfortunately are not working to capacity, and it is here that the motor car industry can exert its influence in increasing the food supplies of the country.

Statistics obtained by the Department of Agriculture, Washington, with regard to farm tractors show that the tractor is averaging forty-eight days' work a year. This figure is based on over 35,000 reports which have been received direct from farmers in every state in the Union. The average of forty-eight days' work per tractor per year is not an estimate, but a correct mathematical average.

Farm tractors instead of working forty-eight days per year should be working 150 days per year, or approximately three times as much as they are working today. Each car dealer in the country and each reader of *MOTOR AGE* can lend his or her influence to see that farm tractors treble the period of usefulness.

This can be done in various ways. For example: The majority of tractor owners use their machines from forty to sixty days per year on their own farms. In addition they do custom work with neighboring farmers, ranging from three to thirty days, depending largely on the size of the machine. Government statistics show that small tractors pulling two, three or four plows do very little custom work, not more than three to ten days. With larger tractors, those pulling five or six plows, the amount of custom work increases to twenty-five or thirty days per year.

THE hope of raising more crops through farm tractors rests with increasing the use of these tractors for custom work. It is questionable if there is a single farmer who cannot arrange to do custom plowing with his neighbor. This can be done in spring plowing, also in July and August plowing for winter wheat and also in fall plowing in many sections.

It has been suggested that the government would be justified in commandeering many of the existing farm tractors and requiring that they work perhaps 20 or 24 hrs. per day in the good plowing seasons if necessary. Instead of the government taking this step it might be possible for the chambers of commerce in many cities in the agricultural zones to organize themselves for the purpose of increasing farm tractor work.

Some may be wondering why this increase in crops should come more through the farm tractor rather than through the horse. One or two examples will suffice to illustrate this:

First: Take the case of winter wheat grown in Kansas and contiguous territory. Government statistics show that the greatest winter wheat yield comes from land plowed deeply in July or in early August. These are very hot months on the farm, and the farmers frequently do not want to work their horses as hard as it is necessary to do when plowing at such times.

Here is where the tractor shows to its supreme advantage, demonstrates that it is much more than a mere substitute for animal power in farm cultivation. During these months the tractor can be worked 20 to 22 hrs. per day if necessary. The tractor can plow 1 to 1½ in. deeper than it is possible for horses to plow at that time. This deeper plowing means greater winter wheat acreage. The chart shows the relative yield of winter wheat per acre on practically the same soil, but with different plowing.

DURING this period of the best winter wheat plowing, every farm tractor in the winter wheat zone should be plowing 20 to 22 hrs. per day from July 1 to Aug. 15.

The following table based on ninety-six government reports from farmers gives an indication of the number of days farm tractors are actually in use. These reports are from sections in the Mississippi valley.

Tractor	Home Plowing	Custom Plowing	Total Plowing	Estimated tractor life
2-plow	46 days	3 days	49 days	294 days
3-plow	46 days	3 days	49 days	392 days
4-plow	53 days	7 days	60 days	510 days
5-plow	40 days	25 days	65 days	585 days
6-plow	39 days	31 days	70 days	735 days

Here is another report based on a great many inquiries from owners of farm tractors in Illinois:

Tractor	Home Plowing	Custom Plowing	Total Plowing	Acres Plowed per day
30-60 hp.	20	21	41	20
15-30 hp.	65	57	122	14
27-45 hp.	30	..	30	13
12-25 hp.	34	3	37	10

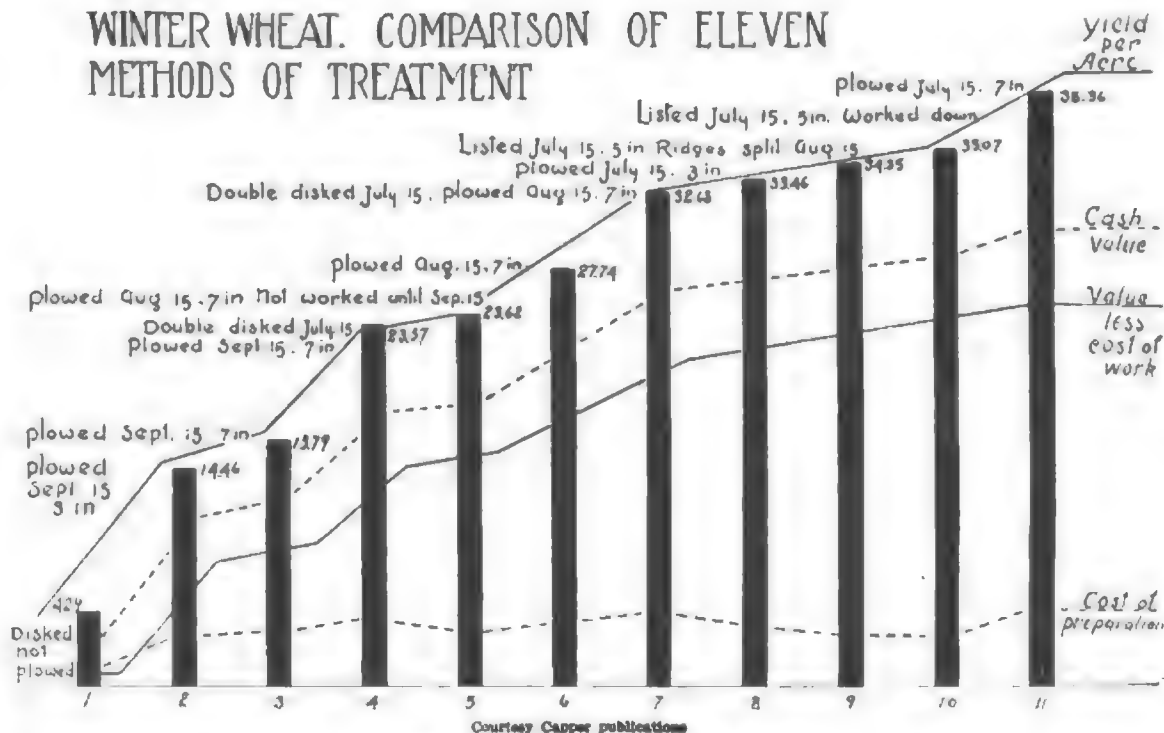
Some conception as to the amount of work farm tractors actually performed in plowing in different parts of the country last year is given by the following tabulation based on reports from different states.

State	Number of Farmers	Total Acres Plowed
Illinois	125	42726
Indiana	61	17573
Nebraska	23	9500

IN its special bulletin on tractors the Department of Agriculture estimates that there are the following number of farm tractors in practical use in the different states. These figures do not include the total number of tractors but represent farmers owning tractors who replied to the Department's questionnaire on the work tractors were performing.

Alabama	313	Nevada	19
Arizona	23	New Hampshire	23
Arkansas	336	New Jersey	107
California	1358	New Mexico	83
Colorado	525	New York	1210
Connecticut	47	North Carolina	452
Delaware	34	North Dakota	2137
Florida	71	Ohio	1305
Georgia	543	Oklahoma	795
Idaho	262	Oregon	318
Illinois	3202	Pennsylvania	595
Indiana	1852	Rhode Island	30
Iowa	2223	South Carolina	387
Kansas	2287	South Dakota	1527
Kentucky	348	Tennessee	442
Louisiana	343	Texas	2235
Maine	53	Utah	88
Maryland	190	Vermont	75
Massachusetts	91	Virginia	434
Michigan	945	Washington	209
Minnesota	1575	West Virginia	90
Mississippi	377	Wisconsin	904
Missouri	1141	Wyoming	186
Montana	808		
Nebraska	1773	Total	34,371

WINTER WHEAT. COMPARISON OF ELEVEN METHODS OF TREATMENT



Making an Army Truck Driver

Qualifications You Must Have to Help Man Uncle Sam's Motor Fleet

CHICAGO, in the last week, has recruited three truck companies of thirty-two men each, one going to Fort Sheridan, one to Fort Benjamin Harrison and one to Fort Riley. Another will be sent to Fort Snelling as soon as it is recruited. These will do duty in the officers' training camps. The recruiting will continue and the men who pass will be held in reserve.

Adequate knowledge of motor truck construction and a sound body of prescribed height and weight are the two main requisites you must possess if you would have the examining lieutenant in the quartermaster's department put his O. K. on your application as mechanic or driver in Uncle Sam's motor truck fleet. Here are the general qualifications everyone must have to be accepted:

First, The applicant must be unmarried and have no one dependent upon him for support. He must be a citizen of the United States, or have made his declaration, and be able to speak, read and write English.

Second, His weight must not exceed 177 lb. or be less than 130 lb. and the weights in between these limits must be not more than 10 lb. below the prescribed weight for a given height.

Third, He must be not less than 5 ft. 5 in. tall nor more than 6 ft. 1 in.

Technical Knowledge Necessary

The quartermaster's department is very strict regarding these qualifications and any variation therefrom means rejection. The men who drive and handle army trucks must be an efficient body of men, physically, mentally and morally. The Quartermaster's Enlistment Reserve Corps seeks only "a high class of intelligent specialists" to render efficient service, when called, without further training. Only men between eighteen and forty-five years are taken, and they must enlist for four years. During that time they must keep themselves physically fit for military service, attend an encampment each year for a period of two weeks and present themselves for active duty at the call of the President. Truck masters are given the rank of first class sergeants, and mechanics are made sergeants. Except in emergencies the Quartermaster's Corps is not required to drill with rifles; it is like a large business concern that handles the business end of the army in time of war, or threatened war.

Application is made in the form shown herewith. In addition there must be filed two letters of reference showing the applicant to be of good moral character with particular reference to sobriety.

There are no fixed technical questions

APPLICATION FOR ENLISTMENT. QUARTERMASTER SECTION. ENLISTED RESERVE CORPS

RECRUITING OFFICER.

Sir: I respectfully request permission to enlist in the Quartermaster Enlisted Reserve Corps of the United States Army, and hereby certify that the following statements are correct and are in my own handwriting:

Birthplace and date of birth.....
Nativity and present residence of parents.....
Height..... Weight.....
Chest measurement.....
Expiration..... Inspiration.....
What sickness have you had, and at what age.....
Have you been ruptured?.....
Do you drink intoxicating liquors? If so, to what extent?.....
Are you married?.....
Have you any one dependent upon you for support?.....
Have you ever been convicted of any crime or been imprisoned in a reformatory, jail, or penitentiary?.....
Have you attended school? If so, how long?.....
Are you a member of the National Guard of any State or Territory?.....
Have you ever served in the United States Army or in any foreign army? If so, state particulars.....
For what occupation in the Quartermaster Section, Enlisted Reserve Corps, do you desire to enlist?.....
State experience you have had during past 5 years in the above line of work, giving name and address of employer.....
Applicant.

*The circumference of the chest is measured by passing the tape around it at the point of the shoulder blade, the arms hanging down. The measure of inspiration is to be taken with the chest inflated to its utmost capacity, and that at expiration after the air has been expelled until the demand for inspiration can no longer be resisted.
War Department,
Q. M. C. Form No. 151
(Authorized Feb. 21, 1917.)

listed to determine the applicant's fitness for becoming a truck driver or mechanic. The questions he will have to answer are solely at the discretion of the examining officer. Every applicant must have had at least six months' experience in driving. From his experience and general qualifications the examining officer determines much of the applicant's ability. The line of questioning in one instance may be wholly different from that in another.

Assume that you are before the officer for examination. He very likely will ask you to picture a dismantled engine and tell you to assemble it from memory. Where you begin will indicate to him whether or not you know the task given you.

Many applicants get the engine assembled and forget that they should have put in a camshaft or some other component part. Some leave out the crankshaft, others connecting rods, etc. You may be asked what you would do if you were separated from the truck convoy and found you had a broken connecting rod. You may be asked what type of engines are used in the particular cars you have driven. It is not expected that you will answer every question as an engineer would, however, but you must

satisfy the officer that you know car and truck construction and can rise to the emergency if called upon to do so.

The Physical Test

If you do not come within the limits of the following table of heights and weights—atripped—it will be useless for you to apply for work in the Quartermaster's Department:

Inches	Weight	Min. wt.	Inches	Weight	Min. wt.
65	130	130	69 1/2	151 1/2	141 1/2
65 1/2	130 1/2	130	69 1/2	153 1/2	143 1/2
65 1/2	131	130	70	155	145
65 1/2	131	130	70 1/2	156 1/2	146 1/2
66	132	130	70 1/2	158 1/2	148 1/2
66 1/2	132	130	70 1/2	160 1/2	150 1/2
66 1/2	133	130	71	161 1/2	152 1/2
66 1/2	133	130	71 1/2	163 1/2	153 1/2
67	134	130	71 1/2	165 1/2	155 1/2
67 1/2	135 1/2	130	71 1/2	167 1/2	157 1/2
67 1/2	137 1/2	130	71	169	159
67 1/2	139 1/2	140	72 1/2	170 1/2	160 1/2
68	141	131	72 1/2	172 1/2	162 1/2
68 1/2	142 1/2	132 1/2	72 1/2	174 1/2	164 1/2
68 1/2	144 1/2	134 1/2	73	177	166
68 1/2	146 1/2	136 1/2			
69	148	138			
69 1/2	149 1/2	139 1/2			

The first thing you will be required to do in the physical test is to sort little skeins of yarn of various colors into piles according to color. This is to determine if you are color blind. Next you will be asked to stand 20 ft. from a card on which are printed letters 1/4 in. high and read them, first with one eye closed, then with the other eye closed. Next you must repeat numbers whispered by the examiner 20 ft. from you. This test is given both ears. Next you remove your clothes and are weighed and measured. Remember that the table of weights given are the weights without clothing.

The next step takes you to the examining doctor, who first tests your lungs and heart with a stethoscope. Then you are asked to swing your arm violently for a few times and your lungs and heart are again tested to find the result of the exertion. Next you will be examined for hernia, then piles. You will have to satisfy the doctor that you have no venereal disease, that your joints are all in good working order, that the arches of your feet are not broken and that you are not afflicted with goiter. If you get through this examination with a good record, marks of identification are recorded and you pass.

First-class sergeants get \$45 a month while serving in the United States, Hawaii, Porto Rico or the Canal Zone and \$54 a month when serving in Alaska, China or the Philippines. Sergeants get \$36 and \$43.20 respectively in these two service divisions. Members of the Quartermaster's Enlisted Reserve Corps take precedence in each grade of said corps according to dates of their certificates of enlistment therein and

(Continued on page 18)

Taxing America's Education

Proposed 300 Per Cent Increase of Mailing Cost Will Hit Motor Age Readers

THE WAYS AND MEANS COMMITTEE of the House of Representatives at Washington has in its war revenue measure a clause by which the postage on business papers such as Motor Age is increased 300 per cent, and in which an entirely new method of levying this postal tax has been drafted. Up to the present time, these publications pay one cent per pound postage. The new plan makes the rate 4.1 cents per pound on an average.

Under the new scheme what is known as the "zone system" is used. This zone system is the same as that used by the parcel post. The schedule of postal rates varies, for the different zones as follows:

Zone 1.....2c per lb.	Zones 6 and 7.....5c per lb.
Zones 2 and 3.....3c per lb.	Zone 8.....6c per lb.
Zones 4 and 5.....4c per lb.	

AN effort was made last Spring to institute this zone system for magazines. At that time it was known as the Randall Rider which was attached to the general postoffice bill. That was defeated. The Ways and Means Committee has announced that it is going to use all efforts to pass the present zone system—it now being advanced as a war measure.

The publishers of business papers stand ready to pay their equitable percentage of the \$2,000,000 war fund needed each year. The publishers do not object, in fact are willing to pay their share, but they do object to this increase of 300 per cent on the ground that it is taxing the processes of the industry rather than the profits. The business papers are willing to pay whatever excess profit tax is necessary. They have shown their good faith in the present war by going to Washington some weeks ago and offering free advertising space to the government to aid in whatever way the government desires. This offer still rests with the government.

ONE of the glaringly unjust features of the suggested increase in postal rates is this zone system. By this system a tax on educational information is placed. The zone system places a heavier burden on the motor car owner or dealer living in Kansas City than it does in Chicago. It says that his magazines must cost him more. For the owner in Denver the cost is still higher; for Salt Lake City it goes higher; for the Pacific Coast it is highest of all.

This zone system aims directly at breaking up the national unity of the country so far as industries are concerned. Industries, like the motor car, or any other great industry, are national. They are not local to one section of the country or another. The national motor publications like Motor Age must be national in character in order to truly represent the industry. The zone system aims at destroying this national aspect of Motor Age. We are all opposed to taxation of schools, yet why does the Ways and Means Committee endeavor to squeeze an unduly high revenue out of educational business magazines which are disseminating information throughout hundreds of industries.

Motor Age asks the co-operation of its readers in combating this discriminating war tax. Like other business papers it wants to share its burden of war taxation. It is ready to meet the excess profits tax as necessary. It offers its advertising space free to the government.

BUT: Motor Age does object to war taxation which tends to cripple the business press.

The only equitable arrangement business publications can make if they are to survive under the proposed legislation is either to increase the subscription rates to *all* subscribers, or else arrange a sliding scale of varying subscription rates for subscribers in each separate zone. In either case, YOU, the subscriber, are affected by the tax.

It is to your interest, as much as to the welfare of your motor car publication, to take exception to a tax upon education. Write your Senator and Congressman—NOW! Go on record as against the proposed legislation. Elaborate to your representatives at Washington on any of the following arguments:

SECOND CLASS rates to magazines are to publications what freight rates are to railroads. Freight rates have recently been increased 15 per cent. What would happen to you, Mr. Businessman, if railroad freight rates were increased 300 per cent? An increase of 300 per cent in second-class rates is going to put many business publications out of business or reduce their profits so greatly that the government will get no income from excess profits.

Under the proposed revenue bill, publishers will pay, and are willing to pay, all taxes paid by any legitimate business, but the proposed zone basis of second class rates will constitute a special or super-tax aimed at the most vital spot in the publishing business.

The adoption of these increased rates will not produce the expected revenue. Many papers will be forced out of business. Others will suffer serious losses in circulation because expiring subscriptions will not be renewed at the higher prices, and new subscribers will be exceedingly difficult to obtain. All will undoubtedly curtail the size of their papers.

More revenue will accrue to the government from the taxes that will be imposed upon publishers' profits, incomes of employes, etc., than from an increase in second class rates that will wipe out profits and throw men out of work, not mentioning other effects.

The zone basis is inequitable and opposed to policy of democratic government. It penalizes national media in favor of local papers. It places undue exactions upon readers in distant zones. It places a discriminatory tax on the dissemination of intelligence. It is not based on true costs which do not increase in proportion to the distance. Terminal costs are the big factor.

At this most critical time, the trade and technical papers are as necessary to the government as they are to business, if we are to have the proper unity of thought and action. These established channels for the interchange of business news and counsel are but little less important than the railways.

Publishers have not participated in the high prices received by farmers, manufacturers, etc., but on the contrary have had to struggle with higher and higher costs.

It's ruinous to stop or impede the forces that create wealth to put, for example, a special tax on seed wheat, to cut down trees to get the fruit, to tear up railroads to get steel for guns. Take the eggs—don't kill the goose.

The second class matter *pays its own way* at the rate of 1 cent per pound. This can be proved. It can be proved, too, that the uniform 1-cent rate has been the greatest single influence for the spread of intelligence and the unification of all sections and classes.

line tank was filled and sealed. The start was made from the Chalmers service station in Grand Rapids. No set course was followed, the car going through the traffic up the heavy grades of the city and through the outskirts. Paul Carlton, a Chalmers salesman, relieved Gee at the wheel, and during the major part of the afternoon and evening four other persons were passengers. At 8 p. m. the day of the race a stop was made for gasoline and checked. The average consumption of gasoline was 13.2 m.p.g. This was low test gas.

JORDAN ADDS SPACE

Cleveland, Ohio, May 11—The Jordan Motor Car Co. has increased the capacity of its plant by taking over 20,000 sq. ft. in an adjoining factory building of the same construction, so located that it becomes virtually a part of the Jordan plant.

ALVORD HEADS WRIGHT-MARTIN

New York, May 11—John F. Alvord has been elected president of the Wright-Martin Aircraft Corp. Mr. Alvord is at present president of the Hendee Mfg. Co., and it is understood that he is to retain that position in the future, as well as serving as president of the Wright Martin Co.

FOREIGN AGENT HERE TO BUY

Chicago, May 14—J. B. Clarkson of New Zealand will be in Chicago this week and in New York from May 21 to June 2 on his annual business visit to the United States. Mr. Clarkson is managing director for Hope Gibbons, Sons & J. B. Clarkson, Ltd., wholesale merchants at Wellington, N. Z. He will buy motorcycles and motor car accessories for his firm while in this country.

HESS-BRIGHT AND S K F FUSE

New York, May 11—In line with plans made last autumn when New York interests, including the National City Bank and Brown Bros., New York, who were interested in the S. K. F. Ball Bearing Co., also acquired an interest in the Hess-Bright Mfg. Co. of Philadelphia, the S K F Administrative Co. has been formed to administer the affairs of both companies.

The board of the new company includes Frank A. Vanderlip, president of the National City Bank; Thatcher Brown of Brown Bros.; F. B. Kirkbride; S. Wingquist; Axel Carlander; Marcus Wallenberg, a banker of Sweden, and B. G. Prytz, who as president of the S. K. F. Ball Bearing Co. has been active in bringing about the fusion between the two companies. Mr. Prytz has been elected president of the administrative company. Budd D. Gray of the Hess-Bright company resigned as president, and will become technical advisor of the company. The manufacturing facilities of both the Philadelphia and Hartford plants will be extended.

Muncie Workers Strike

Motor Industry of City Halted by Demands of Laborers

Some of Men Return to Work Without Settlement

MUNCIE, IND., May 13—Labor troubles, the worst that have ever beset the Indiana motor car industries, have paralyzed the motor car and parts manufacturing plants of this city. At least 3000 machinists are on strike, demanding a 20 per cent increase in wages, recognition of the machinists' union, time-and-a-half for overtime, an 8-hr. day, double pay for Sundays and the re-instatement of discharged employees who were agitators.

The companies affected are the T. W. Warner Auto Parts Co., the Inter-State Automobile Co., the Warner Gear Co. and the Muncie Gear Co. The strike started in the plant of the T. W. Warner Auto Parts Co. Monday evening, May 7, when more than 600 men walked out. Although a few workmen and the office force remained loyal, it was necessary to close the plant. T. W. Warner offered the men a 25 per cent increase in wages, although they asked only 20 per cent. About half of the employees had returned to work Saturday with the understanding that the union was not to be recognized. Officials of the company announced that all departments of the plant would be in operation this week.

A total of 700 men, mostly machinists, went on strike at the plant of the Inter-State Automobile Co. After the strike had spread to this plant, the company made strenuous efforts to persuade the men to return, although no promises were held out. Less than 200 of the strikers had returned to work Saturday.

All the employees of the Warner Gear Co., numbering about 1,200 men, went on strike, and the plant was closed. Less than 200 of the men had returned Saturday, and no settlement was in sight. The plant of the Muncie Gear Co. is closed, following a walk-out of employees. Officials of the company have refused to discuss a compromise with the men, saying they have no inducements to offer. The company has been compelled to cancel several large orders. It already has sustained a large loss.

RANCHER INVENTS TRACTOR

Detroit, May 11—William Turner, ranch owner of Washington, has invented a new tractor, which has been demonstrated successfully on his western farms. The tractor weight is distributed evenly on two large driving drums, which oscillate and enable the tractor to cover uneven surfaces of ground. It is constructed with a low center of gravity to allow it to be driven on side hills without turning over. It is

driven by a gasoline engine and has a large platform for carrying heavy loads of farm products. It will turn in its own area.

The tractor is to sell at a price around \$1,000. Its chief advantage is said to be that it carries all weight close to the ground and can negotiate easily side hills. The drums are 2½ ft. wide and 4 ft. high. The tractor operates by an inside hub transmission which travels a track lining the drum and forces the drum to revolve. The weight is 3500 lbs. Total width over all is 8 ft. Mr. Turner has not decided definitely on the price or how he will market the tractor.

MARMON SELLS BRANCH

New York, May 12—The Marmon branch in this city has been sold to the Marmon Motor Co. of New York. This company is a new organization with T. B. VanAlstyne, formerly advertising manager of the Class Journal Co., as president; F. G. Carrie, former manager of the Marmon branch, as secretary, and Charles Larson, one of New York's most successful dealers, now handling the Oldsmobile, as treasurer.

CHALMERS MAKES MILE IN 38.1 SEC.

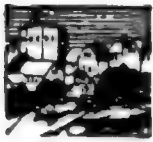
New York, May 11—What is considered a new mile straightaway record in the 161 to 230 cu. in. class was made May 4 by a Chalmers stripped stock chassis at Pablo Beach, Jacksonville, in 38.1 sec., or 94.48 m.p.h. The car was driven by Joe Dawson, who recently joined the Chalmers company to carry on the new series of tests. The car was driven minus its fan. The gear ratio was 3½ to 1.

WILLYS-OVERLAND ELECTS

Toledo, Ohio, May 12—John M. Willys was again elected president of the Willys-Overland Co. at the annual meeting of the stockholders this week. Other officers are: Vice-presidents, C. A. Earl, H. L. Shepler, Isaac Kinsey, James E. Kepperley and Edwin B. Jackson; secretary, Royal B. Scott; treasurer, Frank K. Dolbeer. The directors are John N. Willys, Edward J. Swift, H. T. Dunn, C. A. Earl, H. L. Shepler, Rathun Fuller, James E. Kepperley, Frank K. Dolbeer and Royal B. Scott.

W. H. TURNER DIES

Denver, Col., May 11—William H. Turner, race driver, has died in Denver after an illness of several months. He was known throughout the Rocky Mountain region as "Wild Bill" Turner, a title of admiration and affection given him because of performances as a race driver. He held the record for the Mount Falcon hillclimb, a foothills event conducted by the Denver Motor Club near Morrison, and also had won several road and track racing prizes. He was prominent in trade circles as Wyoming district salesman for the Maxwell, which position he held at the time of his death.



Routes and Touring Information



El Reno, Okla.-Gallup, N. M.

ONCHO, OKLA.—Editor *MOTOR AGE*—Give shortest and best route from El Reno, Okla., to Gallup, N. M.; also mileage.—W. B. McCown.

From El Reno proceed to Calumet, Geary, Bridgeport, Hydro, Weatherford, Clinton, Foss, Canute, Sayre, Delhi, Texola, Shamrock, Tex., McLean, Groom, Amarillo, San Jon, Tucuman, Cuervo, Santa Rosa, Encino, Albuquerque, Armijo, Isleta, Peralta, Los Lunas, Paraje, Grants, Thoreau, to Gallup. The route covers approximately 775 miles.

Vol. 7 of the Automobile Blue Book, published by the Automobile Blue Book Publishing Co., 910 S. Michigan Ave., Chicago, contains complete running directions for this trip; price \$3.00.

Fort Worth, Tex.-Los Angeles, Cal.

Fort Worth, Tex.—Editor *MOTOR AGE*—Give route from here to Los Angeles.—Mrs. C. W. Bagley.

From Fort Worth proceed to Weatherford, Garner, Caddo, Breckenridge, Albany, Hamby, Abilene, Hermleigh, Snyder, Tahoka, Brownfield, Gomez, Plains, Roswell, Negra, Estancia, Moriarty, Albuquerque, Becker, Socorro, Magdalena, Datil, Quemado, Springerville, Cooleys Ranch, Rice, Globe, Roosevelt Dam, Mesa, Tempe, Phoenix, Liberty, Arlington, Aqua Caliente, Palomas, Dome, Yuma, Holtville, El Centro, Dixieland, Camp, Jamul, Encanto, San Diego, Escondido, San Marcos, Bonsall, Fallbrook, Elsinore, Riverside, Ontario, Pomona, DelMonte, Savannah, Los Angeles.

Vols. 7 and 8 of the Automobile Blue Book, published by the Automobile Blue Book Pub. Co., 910 S. Michigan Ave., Chicago, contain complete running directions for this trip.

Nashville, Tenn.-Chattanooga, Tenn.-Washington, D. C.

Danville, Ill.—Editor *MOTOR AGE*—Outline the best route from Nashville to Chattanooga, thence on to Washington, D. C.—Earle Comer.

From Nashville, the route goes through LaVergne, Murfreesboro, Beechgrove, Manchester, Hillsboro, Pelham, Monteagle, Tracy City, Jasper, Rankins Ferry, Wauhatchie, Chattanooga, Coletwah, Tucker Springs, Calhoun, Athens, Niota, Sweetwater, Philadelphia, Tenn., Loudon, Knoxville, Straw Plain, Jefferson City, Morristown, Warrensburg, Greenville, Limestone, Telford, Jonesboro, Johnson City, Milligan, Childers, Bluff City, Bristol, Abingdon, Chilhowie, Marion, Wytheville, Radford, Christiansburg, Elliston, Salem, Roanoke, Blue Ridge, Thaxton, Bedford City, Lynchburg, Amherst, Livingston, Redhill, Charlottesville, Clismont, Gordonsville, Madison Mills, Culpeper, Remington, Opal, Bethel, Halfway, Middleburg, Fairfax, Oakton, McLean, Langley, Georgetown, Washington, D. C.

Vol. 6 of the Automobile Blue Book, published by the Automobile Blue Book Pub. Co., 910 S. Michigan Ave., Chicago, contains complete running directions for this trip.

Des Moines, Iowa-Chattanooga, Tenn.

Adel, Iowa.—Editor *MOTOR AGE*—Give touring instructions from Des Moines to Chattanooga.—E. A. Wiltmer.

From Des Moines proceed to Colfax, New-

ton, Kellogg, Grinnell, Brooklyn, Victor, Ladora, Marengo, Oxford, Coralville, Iowa City, Moscow, Durant, Davenport, Rock Island, Ill., Milan, Swedonia, Alpha, Henderson, Galesburg, Knoxville, Brimfield, Peoria, East Peoria, Groveland, Dillon, Delavan, New Holland, Middletown, Springfield, Mechanicsburg, Decatur, Hammond, Atwood, Tuscola, Newman, Hume, Chrisman, Montesuma, Rockville, Indianapolis, Franklin, Taylorsville, Columbus, Seymour, Valleria, Kossuth, Salem, Borden, New Albany, Louisville, Ky., Mount Washington, Bardstown, New Haven, Hodgenville, Buffalo, Hardyville, Cave City, Scottsville, Gallatin, Nashville, LaVergne, Murfreesboro, Shelbyville, Bellville, Fayetteville, Hazel Green, Ala., Meridianville, Huntsville, Cottonville, Gunterville, Albertville, Boaz, Mountainboro, Attalla, Alabama City, Rome, Cartersville, Emerson, Acworth, Marietta, Smyrna, Marietta, Cartersville, Cassville, Calhoun, Resaca, Dalton, Ringgold, Boynton, Rossville, to Chattanooga, Tenn.

Vols. 5 and 6 of the Automobile Blue Book, published by the Automobile Blue Book Pub. Co., 910 S. Michigan Ave., Chicago, contain complete running directions for this trip.

Newton, Iowa-San Benito, Tex.

Newton, Iowa.—Editor *MOTOR AGE*—Give best route from here to San Benito, Tex.—C. E. Greenleaf.

From Newton, Iowa, proceed to Des Moines, Indianola, Medora, Osceola, Leon, Davis City, Lamoni, Iowa, Eagleville, Mo., Bethany, Albany, King City, Union City, St. Joseph, DeKalb, Weston, Kansas City, Harrisonville, Archie, Adrian, Butler, Arthur, Horton, Nevada, Moundsville, Liberal, Galesburg, Joplin, Galena, Kan., Lowell, Lincolnville, Okla., Miami, Venita, Chelsea, Claremore, Collinsville, Tulsa, Red Fork, Bowden, Kellyville, Bristow, Dewey, Oklahoma City, Packingtown, Yukon, El Reno, Pocomasset, Verden, Anadarko, Apache, Fort Sill, Randlett, Buckburnett, Tex., Wichita Falls, Archer City, Elbert, Albany, Baird, Coleman, Shield, Lohn, Brady, Mason, Fredericksburg, Waring, Leon Springs, San Antonio, Thelma, Leming, Campbellton, Whitsett, Kittle, Mathis, Corpus Christi, Kingville, Sarita, Raymondsville, Cameron, Harlingen and San Benito.

Vols. 5 and 7 of the Automobile Blue Book, published by the Automobile Blue Book Pub. Co., 910 S. Michigan Ave., Chicago, contain complete running directions for this trip.

Beaver Dam, Ky.-Colorado Springs, Col.

Beaver Dam, Ky.—Editor *MOTOR AGE*—Outline route from here to Colorado Springs, Colo. Is it advisable to have a guide book?—Vilas Peters.

From Beaver Dam, proceed to Rockport, Central City, Madisonville, Nebo, Dixon, Wanamaker, Cairo, Weavertown, Henderson, Howell, Evansville, Ind., Stringtown, Warrentown, Fort Branch, Princeton, Patoka, Haxleton, Vincennes, Lawrenceville, Ill., Olney, Noble, Clay City, Flora, Salem, Odin, Sandoval, Carlisle, Breese, Trenton, Lebanon, O'Fallon, Edgemont, East St. Louis, St. Louis, Dwyer, Altheim, Elliasville, Hollow, Gray Summit, Washington, Berger, Hermann, Morrison, Chamous, Oage City, Jefferson City, Centertown, McGicks, California, Clarksburg, Tipton, Ottumwa, Solahna, Mont-

serrat, Warrensburg, Centerville, Holden, Strassburg, Pleasant Hill, Lee's Summit, Kansas City, Waldo, Overland Park, Lenexa, Olathe, Edgerton, Ottawa, Waverly, Emporia, Elmdale, Florence, Peabody, Walton, Newton, Halstead, Hutchison, Nickerson, Sterling, Lyons, Great Bend, Kinsley, Spearville, Dodge City, Cimmaron, Garden City, Deerfield, Lakin, Kendall, Syracuse, Coolidge, Holly, Colo., Granada, Lamar, Hasty, Las Animas, LaJunta, Rocky Ford, Manzanola, Pueblo, Fountain, Colorado Springs.

It is advisable to have a guide book for this contains information as to points of interest, condition of roads, running directions, etc. Vols. 5 and 7 of the Automobile Blue Book, published by the Automobile Blue Book Pub. Co., 910 S. Michigan Ave., Chicago, cover the above tour; price \$3 each.

Reno, Nev.-Gainesville, Fla.

Nixon, Nev.—Editor *MOTOR AGE*—Give routing from Reno, Nev., to Gainesville, Fla.; also mileage.—S. W. Cressey.

From Reno, proceed to Leete, Hot Springs, Lovelock, Imlay, Winnemucca, Golconda, Battle Mountain, Carlin, Elko, Deeth, Wells, Cobre, Montello, Tacoma, Nev., Lucin, Utah, Rosette, Snowville, Tremonton, Deweyville, Brigham, Willard, Ogden, Salt Lake City, Wanship, Coalville, Evanston, Wyo., Fort Bridger, Lyman, Green River, Rock Springs, Point of Rock, Wamsutter, Rawlins, Fort Steel, Hanna, Evansville, Rock River, Boaler, Laramie, Red Buttes, Sherman, Buford, Cheyenne, Egbert, Bushnell, Kimball, Potter, Sidney, Lodgepole, Bigspring, Brule, Ogallala, Paxton, Sutherland, North Platte, Gothenburg, Cozad, Elm Creek, Kearney, Shelton, Wood River, Grand Island, Chapman, Clarks, Duncan, Columbus, Richland, Schuyler, North Bend, Ames, Fremont, Waterloo, Elkhorn, Omaha, Neb., Council Bluffs, Iowa, Underwood, Minden, Avoca, Walnut, Exira, Guthrie Center, Monteith, Dale City, Redfield, Adel, Des Moines, Colfax, Newton, Grinnell, Brooklyn, Victor, Ladora, Marengo, Oxford, Coralville, Iowa City, West Liberty, Moscow, Durant, Davenport, Moline, Ill., Watertown, Hillsdale, Erie, Galt, Sterling, Chicago, Dyer, Kretzberg, Brunswick, Lowell, Schneider, Morocco, Ade, Goodland, Wolcott, Montmorenci, Lafayette, Frankfurt, Antioch, Lebanon, Royaltown, Flackville, Indianapolis, Franklin, Taylorsville, Columbus, Seymour, Brownstown, Valonia, Salem, Pekin, Borden, New Albany, Louisville, Mount, Washington, Bardstown, Athertonville, Buffalo, Hardyville, Bear Wal-low, Mammoth Cave, Cave City, Glasgow, Scottsville, Gallatin, Nashville, LaVergne, Jefferson, Murfreesboro, Shelbyville, Bellville, Fayetteville, Tenn., Meridianville, Huntsville, Ala., Cottonville, Gunterville, Boaz, Attalla, Gadsden, Rome, Ga., Cartersville, Acworth, Marietta, Smyrna, Atlanta, Jonesboro, Pomona, Griffin, Milner, Barnesville, Macon, Perry, Henderson, Graydon, Cordele, Sibley, Ashburn, Tifton, Lenox, Adel, Bahira, Mineola, Valdosta, Lake Park, Jennings, Jasper, Geneva, White Springs, Winfield, Lake City, Macon, High Springs to Gainesville. This route approximately 4000 miles.

Vols. 8, 7, 5, 4 and 6 of the Automobile Blue Book, published by the Automobile Blue Book Co., 910 South Michigan avenue, Chicago, contain complete running directions for the trip.

The Junior Racing Car

Its History and Construction

In Three Parts—Part III

By Harry H. Hartz

STEERING-KNUCKLES may be made from one piece, a blacksmith's forging, or by a simple method, as follows: Secure a piece of cold-rolled steel 1-in. square, equal in length to the outside dimensions of the axle yoke. Turn both ends of the steel in the lathe for a distance of $\frac{1}{2}$ -in. to the size of the king-bolt holes, preferably $\frac{1}{2}$ - or $\frac{3}{8}$ -in. This will give a secure bearing surface for the knuckles in the axle and will eliminate any other method of fastening them in, as you will see when the two pieces of the axle are clamped on the ash block, the knuckle will be held securely. After the two ends are turned down, holes must be bored for the spindle on which the wheel goes, Fig. D, No. 1, which must necessarily be a separate piece of material and also the arms for the tie rod or steering cable. The spindle will have to be fitted according to the size of the hubs on the wheel.

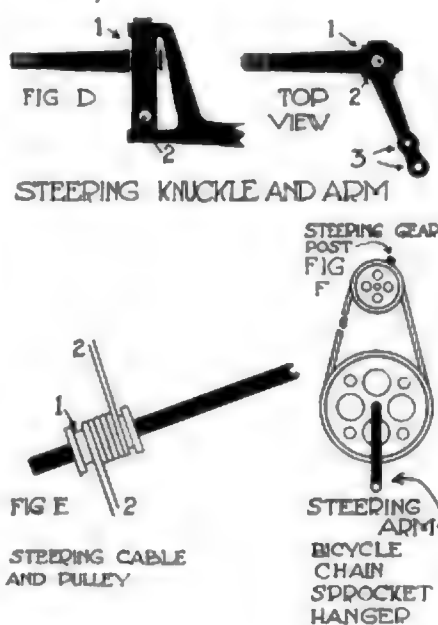
Arm for Tie Rod

The arm for attaching the tie-rod should be placed in holes bored on the adjacent side of the square steel, No. 2 Fig. 1. Two holes must be bored in the ends of the steering arms to make room for the tie-rod and steering cable, No. 3, Fig. D.

The simplest steering arrangement employs the use of a $\frac{1}{8}$ -in. wire cable. This cable is wrapped around a spool which is secured to the end of the steering post, Fig. E, No. 1. The steering post is held into the frame by an iron bracket at the most convenient point. The cable is led from the spool to both steering arms after several wraps around the spool have been given, No. 2. Usually turn-buckles are placed at either end of the cable to make necessary adjustments if the wire would stretch. Another simple steering gear, using a bicycle chain, a hanger and a sprocket is illustrated in Fig. F.

Returning to the subject of wheels for the tiny cars, I have stated that they used 20-in. wheels, but there are three sizes of 20-in. wheels which can be secured from practically any aeroplane manufacturer. These are 20 by 4-in., 20 by 3 and 20 by 2. The 20 by 4 wheel is by far the most desirable, as it is provided with double-tube tires, whereas the 20 by 3 and 20 by 2-in. wheels use only single-tube pneumatics, which do not give good service. If either of the two latter size tires are used, it will be necessary to cover them with motorcycle casings or some other such material to get any wear from them as they are too thin to stand the abuse given in racing.

The rear axle may be made out of either 1-in. square or round cold-rolled steel,



turned down in the lathe at both ends to receive the wheels. An old motor car axle or drive shaft may be used to good advantage in the construction of this part of the machine as well as for the countershaft.

The countershaft should be of 1-in. stock also. This will have to be tapered at both ends to receive the sprockets, if chain drive, or pulleys if V-belt drive. In either case key-ways must be cut for retaining the sprockets or pulleys. A single chain drive is very nearly as satisfactory as double chain or V-belt and much work is eliminated if this extra chain or belt is done away with.

The countershaft may be mounted on ball, bronze or babbitt bearings according to the amount of money which is to be spent. Any of these types works satisfactorily.

Gasoline and oil tanks may be mounted on the frame at the rear of the driver's seat and the latter may be dropped between the frame members. If this is done it will be necessary to use a pressure pump or the Stewart vacuum-feed system. It will be necessary for the oil to be drawn from the tank by a suction pump. Controls, such as gasoline, air, magneto, throttle, etc., can be arranged in handy places around the driver's seat. These minor details can be worked out when the car is nearly completed.

The powerplant, which must necessarily be a one-, two- or four-cylinder motorcycle or light car engine, preferably a two-cylinder motorcycle engine, has caused much inquiry and not a little argument. In answer to the question, "Which is the best engine to use?" which has been asked so many times, I will say that there is not much choice, merely a matter of popular favor. There are few light engines made today but what will adequately serve for this use.

A very satisfactory brake may be constructed on the countershaft by placing a drum on the shaft and making a band to fit this drum and contract and expand the band by a hand or foot lever.

Proper Gear Ratio

This practically concludes the details of construction of the model A car. The gear ratio to be used with these small wheels should be in the vicinity of 2% to 1. With the ordinary motorcycle motor, all other conditions being equal, a speed of from 60 to 70 m.p.h. should be obtained from this type of car.

This model can be built for from \$75 to \$200, depending upon the amount of work done by the builder, the amount of work hired done, the class of material used, etc.

The model B car is the type of car which I have driven ever since the inception of the miniature car racing game. The Vie-Mac was the car in which I started my racing career. This car had the engine under the hood. With it I won the first Culver City race, but during this classic I found that on taking the turns at high speed the inside or left side of the car had a tendency to raise and in practice the car turned completely over with me. This set me to thinking and planning some way to overcome this difficulty. After much deliberation, I devised the plan of placing the engine on the left side, outside of the frame. This I thought would hold the left side of the car down and aid in preventing turn-overs, which theory has proven correct.

It is with this car that I have won practically all the races held in the west and with it recently on the Ascot speedway I turned one lap of the track, or 1 mile, in 54 sec. under official American Automobile Association supervision. This meant a speed of over 80 m.p.h. on the straight stretches and 60 m.p.h. or better on the turns.

The car held the ground perfectly and I continue to pin my faith to the engine on the side. This type car has a 42-in. tread and 75 in. wheelbase, 26 by 24, Hawk Inter-changeable wire wheels, especially built for

me by George W. Houk, and tubular axles. No gearset is used. Very light springs are used in the front only.

The construction of this car is much the simpler of the two junior racing car models.

Two pieces of 1-by 3-in. ash are required for the side members of the frame. These pieces must be 81 in. long. No cross members are needed on account of the fact that the absence of springs causes the axles to be secured directly to the frame. This serves to hold the side members in place. The frame is tapered, being 11 in. wide in front and 17 in. wide in the rear, these being inside frame measurements. The axles are made of Shelby steel tubing, which can be secured at almost any wholesale iron works. The steering yokes are brazed into this type of axle. In the rear, very heavy-walled steel tubing is used for the axle with a piece of cold-rolled steel brazed into both ends to give bearing surface for the wheels.

The blocks which support the engine are made from 2-by 3-in. ash and are held to

the frame by clips which allow of their removal for adjusting the engine or chains. In my car I have constructed a countershaft about 6 in. to the rear of the engine and drive from the engine to the countershaft by one short chain and from the countershaft to the rear wheels by two extra heavy chains. The countershaft is mounted on Hesse-Bright self-aligning ball bearings. The countershaft may be mounted on bronze or babbitt bearings as in the model A car, but ball bearings prove much more satisfactory.

Brake Drum Part of Wheel

The Houk wire wheels which I use fortunately are made with a flange on the rear hubs and a bearing surface on the inside of this flange, which I use as brake drums, having fitted up internal expanding brakes, Thermoid-lined, to stop the car.

The gasoline and oil tanks in this model are carried in the front of the car, the engine being placed on the side, giving ample room for the tanks and the body of the driver under the hood and cowl.

The steering-gear is a worm and gear type which I purloined from an old Overland that had gone to decay and which, with a little working over, made an admirable apparatus.

This type of car will cost anywhere from \$100 to \$300, according, as in the case of the model A, to the conditions under which it is built.

There are many things which the junior mechanic must work out for himself, petty details which would take a book to describe. These, however, can be settled with the aid of, perhaps, the garage mechanic or blacksmith. I am sure that there are many men who will give the youth who is trying to build one of these tiny creations every assistance possible in the matter of advice, and possibly, more substantially.

Interest in the tiny cars is growing rapidly and it is believed that in the near future the sport will have grown so that it will rival motor car racing in the eyes of the public.

Transport Ravages of War Retreat Increases Difficulty

PARIS, May 1—Since the German armies retreated from the Somme and the Aisne and the Allied forces followed them over the wrecked and desolated country, transport conditions have been more difficult than at any period in the history of the war. The effect of the advance has been felt in an immediate call from the British army for more mechanical transport officers to control the additional convoys put into the field. This call happened to coincide with a decision to the war department to transfer some of the younger men from the mechanical transport to combative branches of the service.

The obvious intention of the German general staff is to wreck the country so thoroughly that the failure of the transport services will prevent the Allied armies following up the Imperial troops. The work of destruction has been carried out with characteristic German thoroughness, for trees have been felled across the roads, mines have been exploded under the roads, and particularly at cross roads, houses have been brought down wherever they would form an obstruction, and the land at each side of the destroyed roads has been plowed up to such a depth that it is difficult for motor vehicles to pass.

Notwithstanding all the obstacles placed in their way, the motor transport services have made it possible for the English and French armies to follow up the enemy. At the earliest possible moment large numbers of soldiers were sent out to clear away obstacles, fill up shell holes and make condi-

tions possible for convoys to pass. In the European sense of the word there are no longer any roads, but by a determination which is only rendered more firm by the sight of the wanton destruction, the mechanical transport men keep going and succeed in supplying the infantry and artillery

TRADE AVIATION CONSIDERED

London, April 26—Great Britain is planning for aviation in trade. This announcement was made in the House of Commons to-day by Major J. L. Baird, representative in the House of the Aerial Advisory Board. The government has decided to appoint a committee under the chairmanship of Lord Northcliffe to investigate civil aerial transport after the war.

This committee would consider and report on steps to be taken for the development and regulation after the war of aviation for civil and commercial purposes from domestic, imperial and international points of view, and the extent to which it would be possible to utilize the trained personnel and the aircraft which at the conclusion of peace would be available.

NO BARRETT TRACTOR

In the April 26 issue of MOTOR AGE an account of a tractor test mentioned the Barrett tractor. This should have been Parrett. There is no Barrett tractor, and this was a test with a Parrett tractor, made by the owner, J. P. Roth, and the Parrett Machine Co.

with the food and ammunition necessary to carry on their pursuit.

The greatest indignation is aroused by the sight of the destruction wrought without any military necessity. In much of the reconquered country trees, hedges and other land marks are so obliterated that the French authorities have decided to put motor plows on the land and prepare it for crops without any thought as to its original divisions and ownership. Not a scrap of metal remains in the entire district. Even public statues have been taken down and shipped to Germany. In one village near Neales, now held by the French, the Germans removed every piece of metal out of a factory, then took the owner prisoner on the pretext that he had hidden some copper. His daughter, who remained behind, received three offers of marriage from the German soldiers.

From information given by the inhabitants in the released districts, it is evident that the German armies are very seriously feeling the shortage of gasoline and rubber. When a certain number of trucks were sent out with a load and had to return empty, it was usual to make one of the trucks tow three others on the return trip, thus saving a certain amount of fuel. Very few German trucks are now fitted with rubber tires, the great majority running on steel bandages. It has been discovered that a large number of touring cars, formerly employed by officers in various branches of the service, have been laid up on account of the impossibility of obtaining tires.

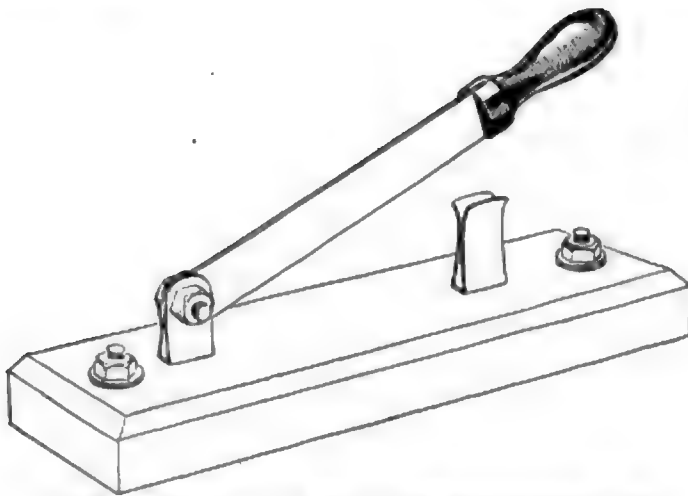


Fig. 250—Here is a common form of the single-pole blade switch

or generator in order that the wasting away of the two interrupter points may be equalized. If the direction of the current through an interrupter remains unchanged in direction, there will be quite a difference in the degree to which the two contact points are worn away. The metal naturally tends to travel in the direction of the current, and as a result there is a much greater wasting away of the positive contact than there is of the negative contact. An inspection of a set of contacts that have been in service for some time will convince you of this fact.

Single and Multipole Switches

A single-pole switch is one in which provision is made for opening the electrical circuit in which the switch is connected at one point only. An example of a switch of this kind is shown diagrammatically in Fig. 248. The positive terminal of the battery is grounded in this case, and the starting motor and its series field winding are connected permanently in series to the positive or grounded terminal of the battery. The starting switch is introduced in the lead connecting the negative terminal of the battery and one terminal of the armature of the starting motor. The lighting switches in this figure are also single-pole, and their connections are very similar to those of the starting switch. Current for the lights flows through the series field of the generator and serves to raise its voltage, which increases its output the required amount to take care of the lamps when they are turned on.

A two-pole switch is one provided with two sets of contacts. Two-pole switches may be so connected that one set of contacts is introduced in one circuit and the remaining set in another circuit, which really amounts to two single-pole switches mechanically connected together, and both circuits are operated at the same time. In the great majority of cases, however, the two sets of contacts of a two-pole switch are introduced in the same circuit, one set being introduced in one side of the line and remaining set in the opposite side of the line. A good example of

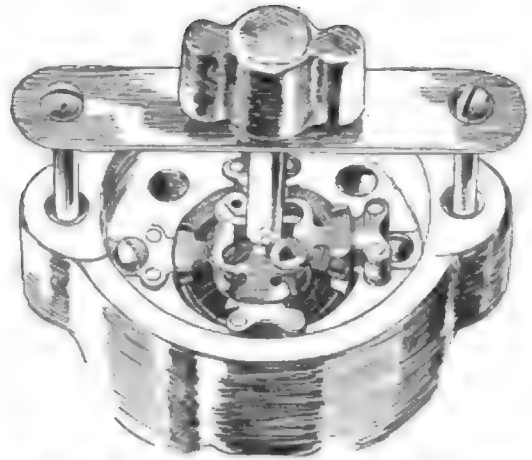


Fig. 251—Interior mechanism of two-pole snap switch

a two-pole switch is shown diagrammatically in Fig. 249, which represents the connections of the rotating starting switch on the 1913 Haynes car.

Multipole switches are those having more than a single set of contacts. A very good example of a multipole switch is found in early models of the Delco systems, in which the switch was used for connecting four sections of a storage battery in parallel for charging and in series for operating the starting motor.

Kinds of Switches

A blade switch is one in which the connection is completed by a metal blade which may be caused to move into contact with the side of a metal jaw or between two metal jaws. A common form of single-pole blade switch is shown in Fig. 250.

A snap switch is one in which the opening and closing of the electrical circuit, or circuits, which the switch is to control is performed by a snap action in the switch. This snap action is produced by a coil spring which winds up as the handle of the switch is turned. After a certain movement of the handle the spring is released and allowed to cause the contacting mechanism of the switch to rotate through a fractional part of a revolution. This rotation of the contacting mechanism is performed in a very short time, thus reducing the tendency for electric arcs to form at the points of make and break. An example of a snap switch is shown in Fig. 251, in which the switch cover is removed partially so that the interior is somewhat exposed to view.

A plug switch is one in which the switching action is performed by moving a plunger in or out of an opening in the top of the switch cover. This plunger may be made of metal or insulating material, and if made of metal it may form part of the electrical circuit when the switch is closed, though not always. The plug itself may be so constructed that it can be removed and the switch made inoperative until the plug again is inserted. Plug switches usually are confined to the operation of ignition and lighting circuits.

PHILIPPINES USE MORE CARS

Washington, D. C., May 12—The Bureau of Insular Affairs of the War Department, which has jurisdiction over customs matters for the island dependencies of the United States, in a statement on the import trade for 1916 of the Philippine Islands says that despite a depression generally due to the war, the motor car trade in the Philippines showed marked development. The report says in part:

"There was a 50 per cent increase in the number imported, and though the war was characterized by the usual condition of declining average price due to cheapening

production and the increase in lower grade machines, the aggregate value of motor cars was materially larger than that of 1915, and there was also a marked increase in parts and equipment.

"Manila as an oriental distributing point for the American motor trade is indicated in exports of some importance of American machines to nearby countries. The growing use of the motor car in the islands is evident by a 50 per cent increase in the quantity of gasoline, which continued to be chiefly American, supplemented to a minor extent by the product of the Dutch East Indies."

NEW FIELD MOTOR

Grand Rapids, Mich., May 11—The Field Motor Co., capital \$300,000, has taken the place of the old Field Motor Co., recently dissolved. The capital stock is divided into 50,000 shares, of which \$250,000 has been subscribed. The stockholders are Byron E. Parks, Adrian M. Noorthoek, J. Palmer McVean, Edward A. Field, John H. Haven, Edward W. Gents and John Behlor. The company has started manufacture in its new plant and has a large business booked. The Field company manufactures a four-cylinder, double-opposed engine, using low-grade oil and fuels.

The Readers' Clearing House

TOO MUCH HEAT TO CARBURETER Depending on Localities—Winter Driving Presents Troubles

Los Angeles, Cal.—Editor *MOTOR AGE*—In your April 12 issue a reader asked if it were possible to get the air too hot for proper carburetion when brought through a stove on the exhaust manifold. Your answer was in the negative.

My car is a 1916 Dodge, which has a stove cast into the manifold. It has a cold air regulator close to the carbureter. Soon after warming up on a long drive or on stiff hill there was a decided lessening of the power, that at times amounted to what seemed to be a complete lack of gasoline. Two or three weeks search for the trouble included the trial of a new carbureter, and a new vacuum tank. I finally removed the tube leading to the stove and several severe tests since then have proven that to have been the trouble.

With the tube on, the car uses engine distillate fully as well as gasoline. I am convinced that the hot air principle in many cases is being overdone. However, that is favorable to the use of low gravity fuel and is an economical advantage.—L. L. Lancaster.

This is a variable condition. What may hold good in one section of the country will not hold true in another section at all. In California where you live, you do not have to contend with the troubles brought about by extremely cold weather. In these northern states it is necessary to get all hot air possible to the mixture during the cold months. During the summer it is possible to cut down the supply of heat and get satisfactory results.

CRITICISMS ON PLANS FOR GARAGE Show Room Too Small for Farm Machinery Display

Farley, Iowa.—Editor *MOTOR AGE*—Suggest plans for a garage 50 by 120 ft., one story, no basement, plans to embody the following: Construction 6 by 8 by 12, hollow tile for sides and end, same for front, fancy brick, plate glass front and 10 ft. on alley; foundation 12 in. concrete, 8 to 4 ft. in ground; floors cement throughout; roof round, frame, composition roofing; trusses 15 ft. apart; ceiling open 12 ft. from floor; light on east and south only; fine extra window sash with wire or other glass as is best; half light in work room and one-fifth light on sides with two or three skylights for good measure.

2—Would you advise tile instead of a cement floor in the office?

3—Would you advise the use of part of the space over the office for a storage or vulcanizing room?

4—Is the office and display room too large for cars, plumbing, farm machinery, etc.?—Count Gibbs.

See Fig. 1. We suggest moving the accessory show cases, etc., to the other side of the room, and combining it with the repair parts and plumbing supplies stock, so that one person could take care of both. This arrangement would also make the office more accessible and attractive, and allow the stenographer or attendant to keep an eye on the front door, insuring visitors prompt attention. We would also suggest moving the vulcanizing room back into the repair shop, as the fumes from cooking rubber would be disagreeable in the show room where they would surely penetrate with the vulcanizing apparatus so close.

As to the hollow tile—a better size, in

our estimation, would be 8 by 12 by 12, with piers of 12 by 12 by 12 filled with cement to carry the ends of the trusses. These piers should each have four ½-in. rods anchored in the foundation 10 in. apart, so they would extend up through their outer corners.

2—Tile would certainly be preferable to cement if style and appearance are to be considered. It would hardly be worth while, however, unless the office fittings, furniture and decorations would be of a quality in harmony with the tile.

3—We are of the opinion that the office and show room should be coiled over, and if this is done, space between the trusses might be used to advantage. The open trusses would not be very attractive, and would make it impossible to heat this portion up to office temperature.

4—If you intend showing much farm machinery, your show room would seem too small rather than too large.

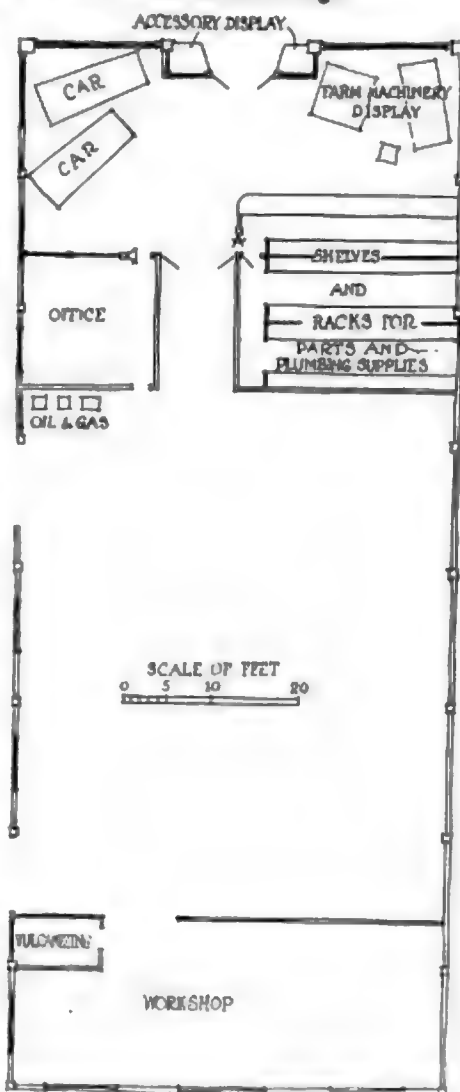


Fig. 1—Garage plans that include farm machinery display

HOW TO USE HORSEPOWER FORMULA

Purpose of Small Bevel Gears in Rear Axle

Owatonna, Minn.—Editor *MOTOR AGE*—Give firing order of twelve-cylinder engine.

2—Explain more definitely how to get the results of the following formulas and give example of each: "To find horsepower: Square diameter of bore and multiply by number of cylinders, divide by 2.5 gives horsepower at 1000 r.p.m."

"To find piston displacement: Square the bore, multiply by .7854 and result times the stroke."

3—Explain use of the little gears in the differential housing. Some cars have three and some four.—M. G. Wynn.

1—No. 1 right, No. 6 left, No. 4 right, No. 3 left, No. 2 right, No. 5 left, No. 6 right, No. 1 left, No. 3 right, No. 4 left, No. 4 right, No. 2 left, is a conventional firing, this being Packard.

2—Assume the engine has a 3-in. bore and four cylinders. Here is the formula, supposing that D equals the bore, N the number of cylinders and HP the horsepower:

$$\begin{aligned} D^2 \times N \\ \text{---} = \text{HP.} \\ 2.5 \\ 3 \times 3 \times 4 \\ \text{or ---} = 14.4 = \text{HP.} \\ 2.5 \end{aligned}$$

Suppose D equals the bore, S the stroke and N the number of cylinders, and PD the piston displacement. Assume an engine has a 3-in. bore and 5-in. stroke, with four cylinders. The formula is:

$$\begin{aligned} D^2 \times S \times .7854 \times N = \text{PD} \\ \text{or } 3 \times 3 \times 5 \times .7854 \times 4 = 141.3 = \text{PD} \end{aligned}$$

3—These are the differential gears. Their purpose is to permit one of the rear wheels to go faster than the other when the car is turning a corner. When the car is being driven straight ahead the wheels are turning at the same speed and these small gears are inactive. However, when the car is turned about a corner and one of the wheels begins to turn faster than the other it is necessary that these small gears provide the flexibility necessary in the drive and they start to rotate in such a ratio that both rear wheels will be driving and still rotating at different speed. Those with three gears perform the same function as those with four. The only difference is on the design.

ON BUICK BEARING ADJUSTMENT Two Ways of Getting at Connecting Rods and Pistons

Knoxville, Tenn.—Editor *MOTOR AGE*—Which is the most simple way to get to the connecting-rod bearings and piston rings of a 1914 model B-24 Buick engine, by removing the bottom of the crank case or by removing the cylinders?

2—Will it be necessary to remove the valves of this engine in order to grind them?

3—This engine is equipped with a Marvel carburetor, and when the car exceeds 8 m.p.h. the engine begins to miss, but runs good and has plenty of power otherwise. There seems to be no leaks in the intake manifold. What kind of

an adjustment should be made to overcome this trouble?—E. B. Halliburter.

1—There are two ways of getting at the bearings and rings in question. First, by removing the oil pan, next by removing the connecting-rod bearing caps and crankshaft-bearing caps and dropping the crankshaft. It will then be possible to pull the pistons out of the cylinders without removing the cylinders. Or this can be attained by removing the cylinders and oil pan and connecting-rod caps, but leaving the crankshaft in place. The latter way, our opinion, is by far the better, because of the fact that piston rings have to be fitted in the cylinder, and if the cylinder is removed, this can be done much more readily.

2—Valves, in order to be ground, must always be in removable condition. In other words, the springs must be removed so that the valves can be ground into the seats and then removed at frequent intervals for inspection. See the repair shop page of last week's *MOTOR AGE*.

3—The carburetor needs overhauling and possible altering to take care of the present low-grade of fuel. Send it to the makers for rebuilding.

MAGNETO IGNITION IS AT FAULT Engine Picks Up When Switch Is Made to Battery

Higginsville, Mo.—Editor *MOTOR AGE*—I have a model thirty Buick roadster equipped with a Remy magneto and a model L. Bechler carburetor. It runs fine when running at the speed of 20 m.p.h., but when going up hill the car begins to slow down. It misses on the magneto but hits regularly when running on the battery, and when turning a corner it also misses on the battery the same as it does on the magneto. I had the magneto repaired some time ago and am under the impression that the points are not properly set.

Would like to have your advice; also the distance to set the points.—W. W. Mollenkamp.

If the engine picks up when you switch from the magneto to the battery, it proves that the trouble is not in the carburetor, but in the magneto ignition. If both battery and magneto work on the same set of plugs it also proves that the latter are all right. The chances are your magneto has become partly demagnetized and generates sufficient voltage for a spark only at high engine speeds. Better send it to the makers to be looked over. Ignition failures are often due to a weak, run down or polarized battery. A defective mixture will often occasion misfiring on account of difficulty of ignition.

The correct adjustment and shape of the contact-breaker points which will apply to most high-tension magnetos is shown in Fig. 2. Theoretically the distance between the points should be the same as that between the points on the plugs.

Regarding Aluminum Manifolds

Geneseo, Ill.—Editor *MOTOR AGE*—What is the bore and stroke of the Flanders 20 and Haynes model 19?

2—What is the engine speed of each?

3—What is the speed of each car?

4—Will an aluminum manifold give more speed and power than a still one? If so, how much?—M. W. Ward.

1—Flanders, 3½ bore, 3¾ stroke. Haynes model 19, 4¼ bore, 5-in. stroke.

2—These cars were built before the days

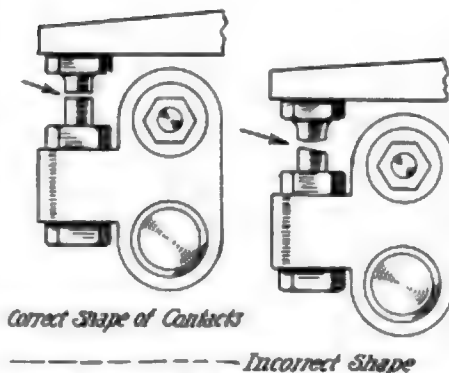


Fig. 2—Correct and incorrect shapes for magneto contact points

of accurate dynamometers for engine speed testing, and there are no available records.

3—Because of the ages of the cars and the further fact that there were no official tests for speed made, it is not possible to give a fair figure.

4—It depends entirely on the type of construction. A steel or iron manifold, if designed properly, is just as efficient as an aluminum one, possibly more so.

Reader's Car Idea

Grand Forks, N. D.—Editor *MOTOR AGE*—I send you the drawing of a car which, I believe includes the three prominent features in cars at this year's shows. See Fig. 3. You will find the car drawn to contain the following features:

- 1—The so-called deck.
- 2—To be without running boards.
- 3—The racing type exhaust.

I am sending this drawing because I believe a practical car can be built along these lines.—Boyd W. Begg.

Ammeter Wires Crossed

Wellburg, N. D.—Editor *MOTOR AGE*—My storage battery has a leak around one of the filler plugs. What can I use to seal it? Is sealing wax all right?

2—Why does the indicator hand on the ammeter of a 1910 Overland six, autolite system, travel to the discharge side as far as ten when running at charging speed and when the engine is slowed up it comes back to center and then shows a small charge when engine is running below charging speed? How can I remedy this?—J. B. Williams.

1—We assume that you have a rubber topped battery with rather high plates and that you are carrying it a little too full. There is no satisfactory method of sealing and the only thing to do is to look at the battery oftener, probably once a week, and be careful of the level.

2—It appears that the wires to the am-

meter are crossed. Change these wires one for another, that is, fasten each to the opposite terminal and the instrument will register correctly.

HE BREAKS PORCELAINS IN PLUGS Probably Due to Overheated Engine— Look to Cooling System

Miami, Ohio.—Editor *MOTOR AGE*—I have a model 86 Overland which uses a Continental engine six-cylinder rated at 45 hp. It seems as though I have a great deal of trouble breaking porcelains in the plugs, which I think is due to excessive heat for the kind of plug used, and when I have one porcelain broken in this engine and have a pull on a grade about a mile long, the engine back fires as though short of gas; at this time I can pull the switch and the car will run on one or two cylinders just the same, and seems as though the car overheats and ignites the gas. What I would like to know is, Why does one broken porcelain put the rest of the cylinders out of commission? Explain fully.—E. Z. Gieringer.

Your trouble evidently is in the cylinders, overheating causing pre-ignition. A common cause for an engine running with the switch open is red-hot plug points or overheated cylinders. It may be that your cooling system is not functioning properly. Too rich a mixture, carbon deposits, tight bearings, defective cylinder lubrication and loose fan belt all tend to make an engine overheat. Check up on these points and make sure they are right. Then install a new set of plugs, after which your troubles should disappear. The broken porcelain you mention probably does not put the rest of the cylinders out of commission so much as the above mentioned conditions of the engine do. In other words, the breaking of the porcelains is incidental to these conditions.

HIS CAR NEEDS ADJUSTMENTS Can Check Valve Lift By Stem and Lifter Clearance

St. Louis, Mo.—Editor *MOTOR AGE*—I have a Saxon Four roadster, with factory date of August, 1914. What should the compression pressure be in this engine?

2—It is equipped with a special Mayer carburetor, which has leaked for over six months, the gasoline continually running down off the handle of the needle valve. There is a small air vent the size of a pinhead, about ¼-in. from needle valve, which the oil appears to run through. The first two years I had no trouble but the last year when the engine is running, the oil drops off the handle of needle valve in a stream. I have had carburetor off and cleaned it. Have had a garage man go over it. He said the needle valve did not seat properly and ground same down, but it still leaked. Then I took it to my dealer who put new packing around the needle valve and lowered the float valve. It still leaks. Can it be on account of the heavy oil now used? Would you advise a new carburetor of more efficient make?

3—Makers of the car say the valves have a lift of ¼-in. How can I check the lift or clearance best, as I am informed much loss of power comes from improper adjustment of push rods.

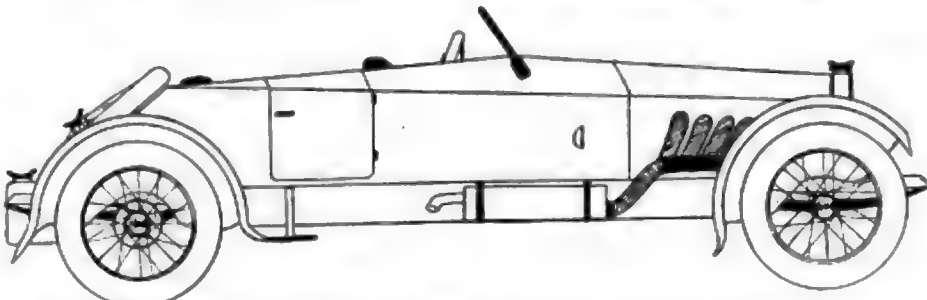


Fig. 3—Reader's idea of practical car with season's three prominent features

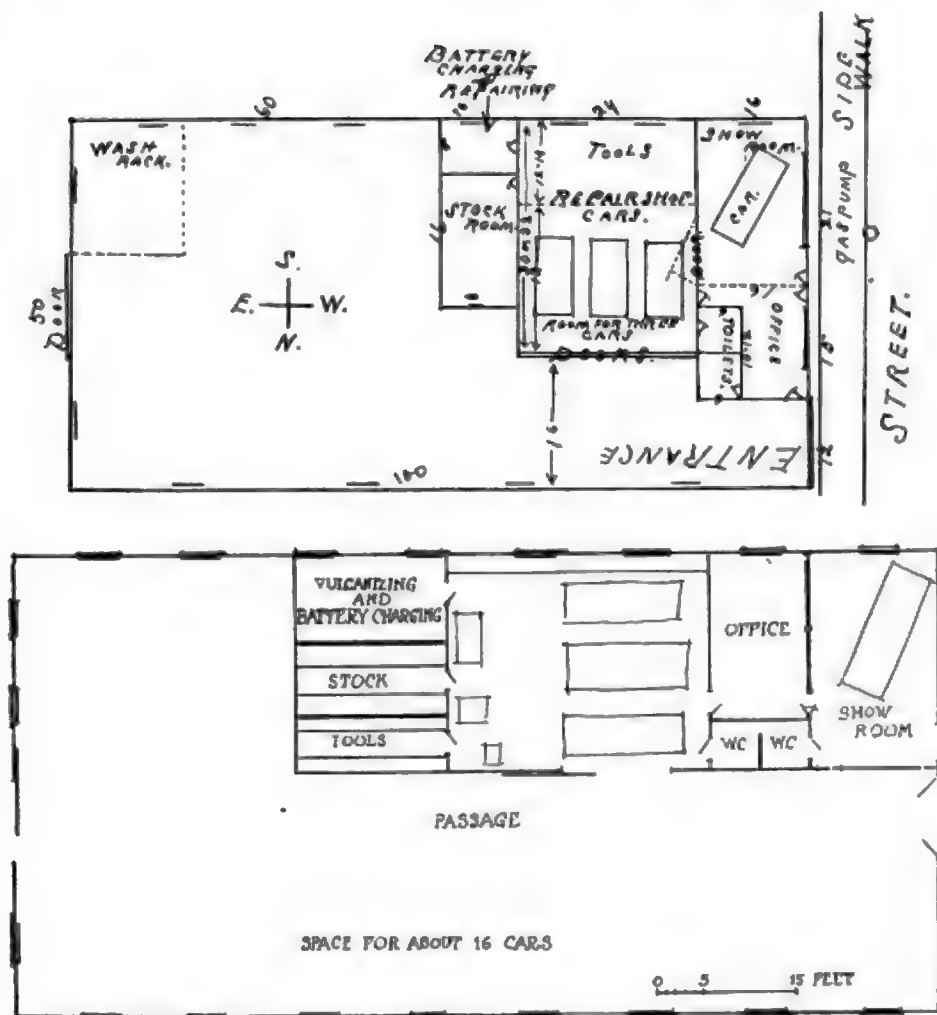


Fig. 4—Reader's and critic's plans for garage 50 by 100

At present I can get very little power from the engine.

4—The main leaf spring on the front axle is broken. Would an extra main spring—making a double main spring from axle to frame—stiffen the spring too much and make riding hard?

5—This car is run on six dry cells. Would there be any advantage in increasing the cells to say, eight, ten or twelve? Would it increase the intensity of the spark and lengthen the life of the cells?

6—The left rear wheel of my car oscillates or wobbles from top to bottom. What is the cause of this, and is it dangerous except for the extra wear on casing?—W. B. Buffington.

1—About 55 lb. gage.

2—We would advise a modern carburetor—one which is adapted to handle the present low grade of fuel. As to the make we can offer no preference.

3—You can check the amount of lift and thus the proper adjustment by the distance between the push rod and the valve stem. This should be about .004 in., or about the thickness of an ordinary calling card. If all valves are set with this clearance they will be in proper adjustment, providing the cams themselves have not become unduly worn, which we do not think is the case.

4—The extra main spring you suggest would make the car very hard riding. Better stick to the present method of springing.

5—There would be no advantage in increasing the number of cells. Even if you did reduce the current consumption per

cell, the natural deterioration of the cell and consequent loss of power would about compensate for the difference.

6—Either the bearings within the wheel are worn, the drive shaft is bent, or the wheel itself has become out of true. It should not be permitted to exist. It inflicts a strain on the driving mechanism.

Haynes Wiring Diagrams

Peru, Ind.—Editor *MOTOR AGE*—Show by diagram the wiring system of the Haynes light six and also of the Haynes light twelve.

2—How much speed is a Reo six model M. supposed to make?—Glen Mattox.

1—Shown in Figs 6 and 7.

2—There is no official record of the speed, nor a claimed speed by the makers.

No Best Dimmer Known

Arkansas City, Kans.—Editor *MOTOR AGE*—Is it necessary to equip a car having pressure-system gasoline feed with a differently-designed carburetor when changing this to the vacuum feed system?

2—What is the best dimmer in connection with headlights, a lens that will concentrate light on driveway, or a lens that will diffuse the light? I am partial to light concentrated on the driveway in preference to dimmers or diffusion of light.—C. D. Lockwood.

1—No.

2—This question is still a subject of discussion. Both types have bad and good points. The concentrated beam deflected to the road gives the better light for fast driving, but is likely to be thrown into the eyes of others when not on a level road. The diffused beam gives the least glare and

best roadside light, but not as great distance illumination.

WOULD HAVE SHOWROOM NOISELES

Criticism of Garage Plans Advises One End Entrance Only

Oseo, Ill.—Editor *MOTOR AGE*—Am planning a garage and inclose two drawings (1) of part of town, (2) a plan of a garage. What suggestions and corrections can you give for the arrangement of garage inside? The town has about 800 inhabitants, 100 miles north of Kansas City on the main line railroad, Chicago to Kansas City. There are two trails through town, the S. W. and C. K. C. & G. We have electric lights, 24-hr. service, no waterworks and one other small repair shop.

Garage—location and size, 50 by 100, settled. Will likely have one row of posts through the center, 20 ft. apart, first post at the west end, 4 ft. off. The garage will be about one and one-half blocks from the main business part of the town. Unsettled questions—agency for cars, showroom, entrances, where and how many entrances may be had on east end without any trouble. Which end for front? Gasoline pump at curb. Repair shop partitioned off from rest of garage.—Charles F. McClain.

We would suggest that you change the plan slightly and, instead of having a row of posts through the center, have a continuous partition, with a passage alongside this, which will leave plenty of room to park a continuous row of cars from front to back, all being accessible at all times. The dimensions of the other divisions have not been changed materially, but the office is put behind the show room to separate it from the repair shop, where the noise of machinery and pounding and smell of hot grease, etc., might have a detrimental influence on a possible customer. It might even be advisable to interpose the stock and tool rooms also as an additional sound arrester. We cannot see the objection of having an entrance at both ends, and if there is any advertising to be gained by a view from the railroad station, we would think the main entrance should be at the rear, or east, end rather than on an unfrequented side street. An electric sign would be a good feature, placed so that it could be seen from the main street—possibly on top of the building.

How to Build Junior Car

Troy, N. Y.—Editor *MOTOR AGE*—I am interested in miniature racing cars. Give addresses of companies who construct these cars.

2—Are there any firms who make and sell parts and plans so that I could construct a junior car?—Ralph Stubblebine.

1-2—To our knowledge there is no company manufacturing these cars. You will find in this issue, part 3 of the article "The Junior Racing Car, Its History and Construction," by Harry H. Hartz, which is the conclusion of the article begun on page 28 in the May 3 issue of *MOTOR AGE*. This article will give you a good idea as to how these cars are constructed.

Mysterious Knock in Buick

St. Leo, Minn.—Editor *MOTOR AGE*—I have been unsuccessful in locating the knock on a Buick Model D-44. When driving at about 25 m.p.h. on a level road it is not noticeable or when ascending a hill, but when driving faster a continual knock is apparent on the camshaft side. Can you explain it?—Mathias Hagebach.

The knock is very probably in the valve mechanism. It may be what is known as a valve slap—a noise created by a valve dropping upon its seat, or it may be that the valve lifter guides are loose so that

there is play in that part. Another source may be in the oil pump. If the noise is rather loud and of a metallic sound it may be a piston slap, due to a piston fitting poorly within the cylinder.

PECULIAR TROUBLE IN SPLITDORF

Probable Cause is in Cam—Remedy Replacement

Chillicothe, Iowa.—Editor *MOTOR AGE*.—We have a Splitdorf Dixie 40 magneto on an Overland 88 which has been giving trouble for some time, and we cannot locate the trouble. It produces two sparks per revolution. One spark is good, the other weak; this makes every other cylinder miss. We have changed from Splitdorf plugs to another kind with a slight improvement, but the trouble continues to make the running disagreeable. We have changed wires, the brushes are good, and are sure it is beyond the distributor. The platinum breaker points become fouled quickly. We have them as flat and smooth as possible and tried a variety of adjustments. It will arc or spark at the points at a difference of speed on an adjustment for normal speed. We have made every test and changed or alternated the timing, and the weakness continues from the same terminals; that is, from cylinder 1-4 to 2-3. The same kind of symptoms appear on another car of the same make and magneto.

Can you tell us what may cause this? Is it a weakness of some part of the magneto that may be replaced, or could it be some part that could need adjustment or cleaning?—M. L. Dickson.

It would appear that one point of the cam on the end of the shaft is lower than the other, giving an irregular opening to platinum points with the result that there is a proper spark in one place and an improper one in the other. The remedy is replacement of the cam with a new one and proper alignment of the points.

Attention in the above manner plus proper adjustment and cleaning should be all that is necessary to remedy the trouble. The removal of Splitdorf plugs for another make would serve no useful purpose, as the changing of plugs has nothing to do with improving the source of ignition current.

Saxon Roadster Ammeter

Kellettville, Pa.—Editor *MOTOR AGE*.—Give diagram for wiring an ammeter on a Saxon roadster, Model 14.—F. J. Henderson.

The diagram is shown in Fig. 5.

New Engine Overheats

Cushing, Okla.—Editor *MOTOR AGE*.—Should a new engine overheat after being driven 1800 miles?—E. W. Pulliam.

After a car has been driven 1300 miles

it may have collected enough carbon in the cylinders to cause overheating. There may be trouble in the circulating system. The valves may be improperly adjusted so that they do not open wide enough. If it has been driven that distance and everything is in proper adjustment and the engine clean it should not overheat.

Exhaust-Valve Springs Heavier

Crawford, Ga.—Editor *MOTOR AGE*.—I notice on the Maxwell Junior two of the valve springs are stronger than the other two. Where does the strong spring go, on the intake or the exhaust, and what is the object in not having them all the same tension?—M. C. Armel.

The valve springs are stronger on the exhaust than on the intake, for the reason that the valves on the exhaust side must be

closed against greater pressure than those on the intake.

FORD MAGNETS CHARGED IN CAR

Storage Batteries, Dry Cells or 110 V. Direct Current Used

Austin, Tex.—Editor *MOTOR AGE*.—Explain method of recharging a Ford magneto without tearing down the engine.—Austin Dozier.

The problem of remagnetizing the Ford magnets without removing them from the car is simply a case of getting these magnets properly placed and sending sufficient current through the coil to produce saturation of the magnets.

Here is the way you should go about it to place the magnets properly. Remove the floor boards. Have the car facing either east or west. Measure a point about 1¼ in. to the left from the center of the terminal. This point should be marked on the case. Place an ordinary compass squarely in back of this point and about 3 or 4 in. back of the top of the magneto case. Now have the engine turned over very slowly. When the north or N point of the compass points directly at the mark stop turning the engine over.

With this setting the magnets are properly arranged. The S pole of one of the magnets is square behind the first coil, and each magnet pole is back of a coil. The next proceeding is to energize the magnets, and this may be done in several different ways.

Before energizing, the magneto wire should be removed from the terminal. One

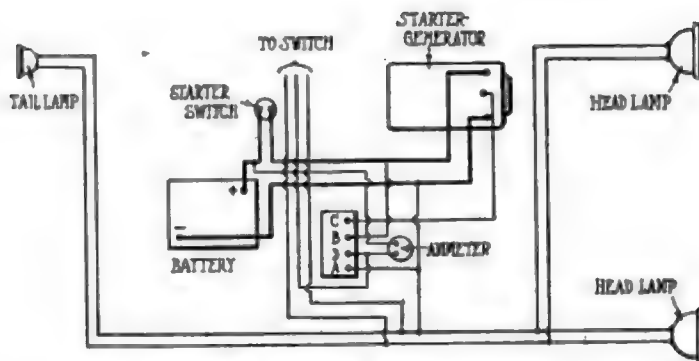
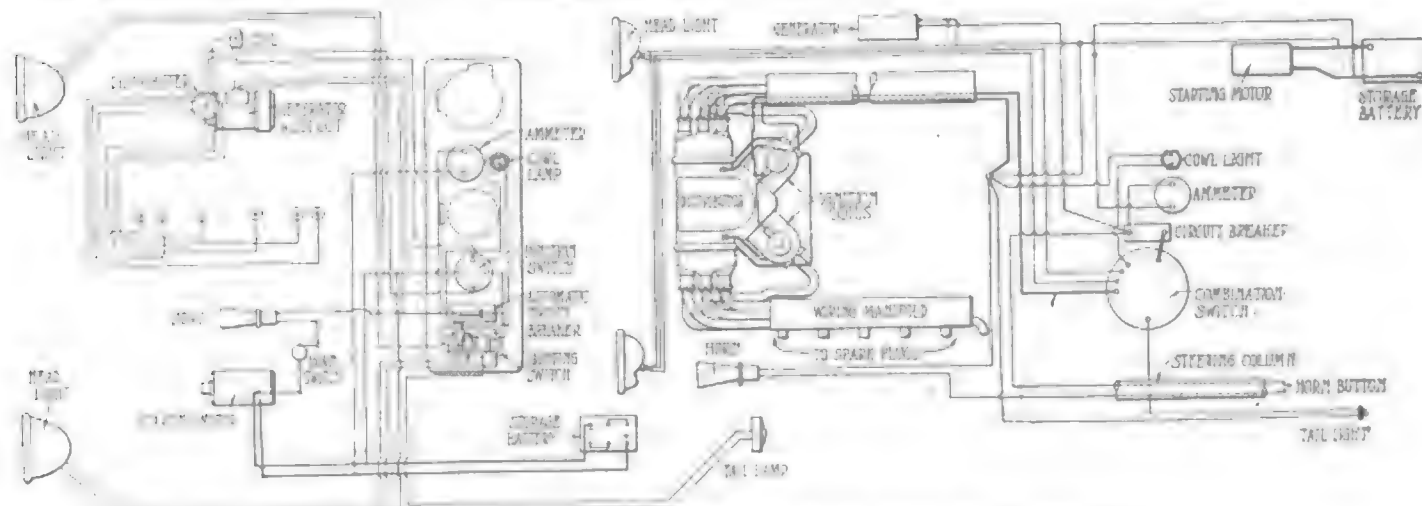


Fig. 5—Diagram for wiring an ammeter on a Saxon roadster

Inquiries Received and Communications Answered

L. L. Lancaster.....Los Angeles, Cal.
 Count Gibbs.....Farley, Iowa
 M. G. Gwynn.....Owatonna, Minn.
 E. B. Halliburton.....Knoxville, Tenn.
 W. W. Mollenkamp.....Higginville, Mo.
 M. W. Ward.....Geneseo, Ill.
 Boyd W. Begg.....Grand Forks, N. D.
 J. B. Williams.....Wellsburg, N. D.
 E. Z. Gieringer.....Miami, Ohio
 W. B. Buffington.....St. Louis, Mo.
 Cohen Mercantile Co.....Woodville, Miss.
 Glen Mattox.....Peru, Ind.
 C. D. Lockwood.....Arkansas City, Kan.
 Charles F. McIlain.....Osceola, Ill.
 Ralph Stubblebine.....Troy, N. Y.
 Mathias Hugelbach.....St. Leo, Minn.
 M. L. Dickson.....Chillicothe, Iowa
 F. J. Henderson.....Kellettville, Pa.
 E. W. Pulliam.....Cushing, Okla.
 M. C. Armel.....Crawford, Ga.
 Austin Dozier.....Austin, Tex.
 Jonesboro Supply House.....Jonesboro, Tenn.
 Kenneth Dolph.....Hastings, Iowa



Figs 6-7—Wiring diagrams of the Haynes light six, left, and the Haynes light twelve, right

way is to secure three or four 6-volt storage batteries and connect them in series. This will give a total of 18 or 24 volts. The wiring with three 6-volt batteries, fully charged, mind you, is shown in Fig. 8. Connect the positive wire to the terminal, and then touch the negative terminal to the engine frame.

About 24 to 30 amp. will be required to energize the coils properly. There will be no harm done with a little more current, although if the connection is maintained too long the coils will overheat with the possibility that the insulation would be damaged. The most satisfactory way is to make and break the ground connection five or six times, leaving the connection closed about a second each time.

Dry cells can be used as a source of recharging current. It will take at least forty-eight of them strung up as shown in Fig. 10, connected in series-multiple, with sixteen cells in series. The combination will give about 24 volts, and if the cells are fully charged, in fact new, there will be sufficient current for a satisfactory job.

If one has a 32-volt direct-current generator it can be connected directly to the magneto without any resistance in the circuit. The charging process is carried on as described above.

Direct city current of 110 volts can be used for the work in conjunction with a bank of lamps, or a resistance coil. Alternating current cannot be used unless it is transformed to direct current by a rectifier.

A layout for a lamp bank is shown in Fig. 11. It will be necessary to use twenty-five or thirty 32 c. p. carbon lamps. A 3 ohm resistance coil will have the same effect. These can be purchased, or easily made. Wiring for this charging method is shown in Fig. 12.

Such a coil can be made out of about 13 ft. of No. 16 nichrome resistance wire, or about 8 ft. of No. 18. Then, too, one can use 18 per cent German-silver wire, which will require about 35 ft. of No. 16, or about 22 ft. of No. 18.

Batteries Charged by D. C.

Woodville, Miss.—Editor MOTOR AGE—Give diagram and instructions how to build board with lamps for charging storage batteries with direct current. Should lamps be wired in series

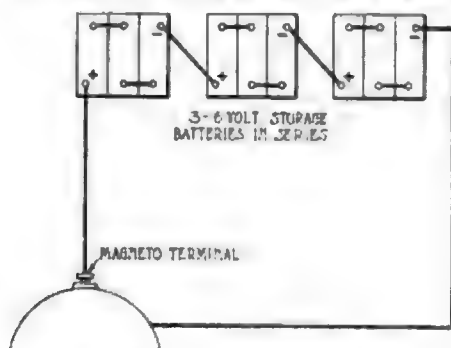


Fig. 8—Wiring with three 6-volt batteries fully charged

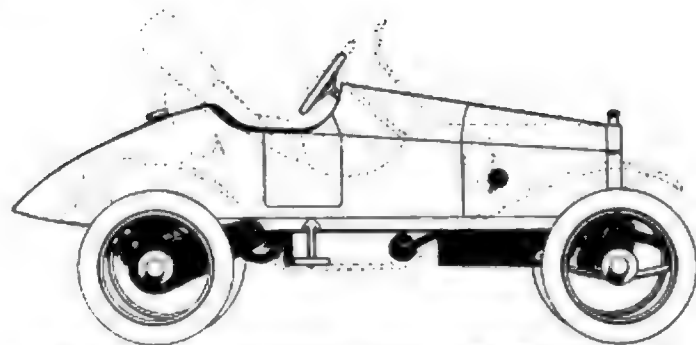


Fig. 9—Metz 22 converted into a speedster with seat and steering post lowered as much as possible

or multiple? We have ammeter and voltmeter. —Cohen Mercantile Co.

Descriptions of devices which will meet with your needs will be found in the Readers' Clearing House section of the May 3 issue of MOTOR AGE.

METZ 22 MADE INTO A SPEEDSTER Cannot Lower Frame at Cost Within Value of Car

Hastings, Iowa—Editor MOTOR AGE—Publish diagram for converting my Metz 22, purchased in 1913, into a speedster. I want the seat just as low as possible and steering post lowered.

2—Could I do this without special tools, or could a body be purchased?

3—Is the friction drive used in this car considered satisfactory. Are two drive chains on a chain-drive car better than one?

4—Would aluminum pistons increase the speed?

5—Is there any way of lowering the entire frame of this model?

6—Could I construct the car so the hood would come up close to the steering wheel and the back end covered tapering to a point?—Kenneth Delph.

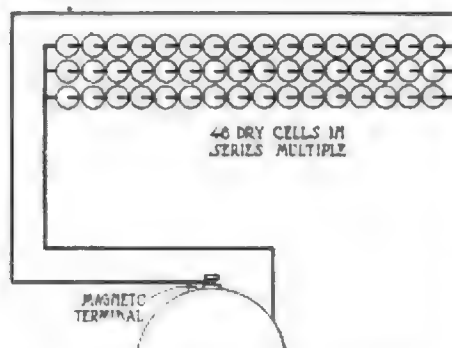


Fig. 10—This combination will give about 24 volts

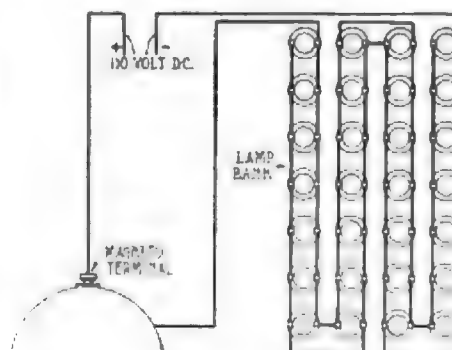


Fig. 11—Layout for a lamp bank, indicating number of lamps

1—Shown in Fig. 9. The seat cannot be lowered much because of the friction disk. This must be the major consideration in lowering the seat. Thin leather cushion without springs will assist in lowering the seat to a minimum.

2—We know of no one making such a body. As far as tools are concerned, it would require ordinary sheet-metal working equipment. Construction of such a body is out of the hands of a total amateur in sheet-metal working.

3—Yes. One chain, of the type used, is sufficient.

4—Yes, if properly fitted.

5—Not within a price figure which would be anything but exorbitant.

6—As shown in the sketch.

Who Makes This Body?

Jonesboro, Tenn.—Editor MOTOR AGE—We have a customer for either a car with the following type of body, or for the body only. I would be interested only in car with this type of body retailing around \$1,250, or under.

Body to have sloping windshield, top to be either stationary, or so as to be let down; preferably designed to be arranged with a top that will take down, being similar to one made by the Paige people, their Brooklands, which is supported by uprights that can be detached and the top rolled up.

The front seat to be capable of holding three passengers and a divided section to be lifted out as in the case of the Briscoe.

Glass drops for the two front doors, and the sides of the tonneau.—Jonesboro Supply House.

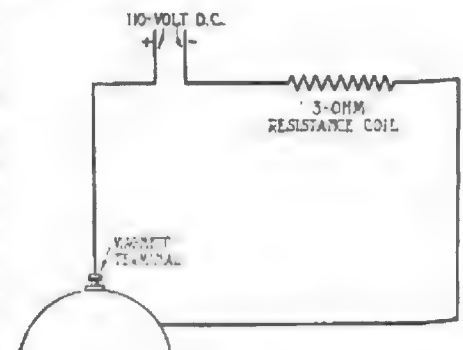


Fig. 12—A 32-ohm resistance coil that may be used

From the Woman's Viewpoint

Illinois Women Organize for War

THE women of Illinois are organized for war, whether it be motor service or more static.

Two hundred women were present at the meeting of organization held in Chicago the latter part of last week to form a central committee. This committee is to represent all the women's organizations of the state, which will have general direction of all feminine activities of wartime nature.

It takes quite a memory for anyone to be able to give the title of this woman's defense council first call. The name was suggested after telegraphic advices from Washington and is:

WOMAN'S COMMITTEE OF NATIONAL COUNCIL OF DEFENSE, ILLINOIS.

You see from this that the committee is not merely a local organization. It is more than that. It is national, and as such a much more important future for it is promised.

The call reads, "To avoid duplication of effort; to utilize organizations already in existence; to promote efficiency and give every woman an opportunity for patriotic service at home or abroad."

This, then, is the object.

Governor's Wife Is Chairman

Mrs. Frank Lowden, the wife of the governor of Illinois, and Mrs. Antoinette Funk and Miss Agnes Nestor, the two latter representing Illinois on the national council of defense, were chosen honorary chairmen of the Chicago committee. Executive officers of the state committee were elected as follows: Chairman, Mrs. Joseph T. Bowen; secretary, Mrs. George W. Plumber; treasurer, Mrs. Cyrus Hall McCormick; director, Mrs. Ira Couch Wood.

Permanent headquarters have been opened with the director and a staff of assistants in permanent charge. They are ready and anxious to answer all inquiries from organizations of women or individuals as to how and where they can best help the country in the present crisis.

A uniform registration fee of 10 cents will be collected from every woman who puts her name down for work in any department of the committee's activities. Large contributions are being accepted, of course, from women who wish to help pay the running expenses of the work.

The central committee will issue uniform registration cards after the model of the National Council of Defense, and send them to all the organizations of women in the state. Further registration is to be made by each club from its members.

Once enrolled each woman can do her

bit as she wishes. Among the many opportunities already outlined are keeping up local charities; food production, farming and gardening; hospital supplies, comforts for soldiers and sailors, public health, inspection, care of enlisted men's families.

Another organization in which the Chicago women are interested now is that organized "to aid in the prosecution of war and in the administration of war relief." This is called the citizens' war board of Chicago, and both men and women are members. The board of directors contains two women and thirty-two men, one of the women being Mrs. Ira C. Wood, director of the central committee, the other being Mrs. Gertrude H. Britton.

Mrs. Wood is having all kinds of positions heaped upon her in the national work for defense. As if these two positions were not enough she was chosen executive secretary of the woman's committee of the national council of defense, and went to Washington for her new position. Miss Harriet Vittum was elected director of the woman's committee of the national council of defense, Illinois division.

Permanent headquarters for the Illinois division have been opened at 60 East Madison street. Several names have been added to the advisory council since the organization, among them that of Mrs. Franklin Martin, whose husband is on the National Council of Defense in Washington. Practically every woman's organization now is enrolled, and as fast as new ones are discovered it is the wish of Mrs. Joseph T. Bowen, the chairman, that they join.

How Western Girls Staged Fallon Sink

FALLON SINK—for the benefit of the motorist who has escaped it—is a strip of road in Nevada in which everything but alkali and sand is mired. It is the only real blot on the Lincoln highway, and Northern California objects seriously and effectively, as it turned out. It determined to raise \$50,000, and \$10,000 in Alameda county in which Oakland is situated.

Here's where the girls come in.

The Oakland Chamber of Commerce issued a call for pretty girls. The girls and everybody else then turned to with picks and shovels and reproduced Fallon Sink on one of the boulevards. Dirt, mud and gravel, was dumped on the pavement until the motorist had to literally wade through. And then 100 of the girls took their places on each side. No motorist got by with less than \$1 swelling the fund. The day netted \$2,000.

War Committee to Help Women

THE national board of defense has appointed a committee on women in industry to prepare the way for women workers in munition and other war product plants. The idea is that the United States should profit by the mistakes of England, also by guarding its women workers.

Miss Mary McDowell, head resident of the University of Chicago settlement house, a member of the committee and chairman of the subcommittee on alien women, according to the Chicago Tribune, says that the speeding up in the English factories decreased the output of munitions instead of increasing it, as the pace was too fast and factory conditions for the women were so poor that there was a vast amount of sickness, while many of the women broke down and had to give up work entirely.

Motor Bus Joys In Spite of War

CHICAGO'S motor buses are as yet very novel creations that roam the boulevards. There are all kinds of rides and parties given atop the gorgeous vehicles, and the other day there was one of these parties de luxe, for even the motor bus company joined in.

Miss Emily Larned of Chicago is given a good deal of credit for bringing the motor buses to Chicago. The bus company offered Miss Larned one of its vehicles for an entire afternoon to transport a party of friends anywhere in the city. Guests were invited for every one of the seats, and the University of Chicago was made the end of the journey southward. The entire party was asked to take tea with President and Mrs. Harry Pratt Judson at the university.

National Council Pledges Services

THE National Council of Women met in Chicago recently and decided to devote most of its activities to war service. A message offering the co-operation of 7,000,000 women represented was sent to President Wilson. Miss Kate Davis of Cleveland, Ohio, who has been largely responsible for the war organization of women in Ohio, and for work among children, led the movement to send a letter to the governor of every state, advocating the organization of work for those between eleven years, and the conscription age for war service along industrial, vocational and agricultural lines.

trailers, designed and patented by James W. Menhall, who, until recently, was vice-president of the Warner Auto-Trailer Co.

Chevrolet Factory for Salt Lake—The Chevrolet Motor Co. will build a large assembling plant at Salt Lake City, Utah.

Blanchard Elected Vice-President—Frederick C. Blanchard, formerly works manager of the Ashcroft Mfg. Co., has been elected vice-president in charge of manufacturing for the Detroit Lubricator Co.

Oldham is Stationed at St. Louis—C. A. Oldham has been made the district manager of the United States Tire & Rubber Co. in St. Louis, Mo. Mr. Oldham was formerly resident manager at Kansas City.

Jameson to Briscoe Factory—W. B. Jameson has been appointed in charge of the factory of the Briscoe Motor Corp. Mr. Jameson was formerly in charge of the New Castle, Ind., factory of the Maxwell Motor Car Co.

Bower to Harry Newman Co.—Joseph Bower has been appointed retail sales manager of the Harry Newman Co., Chicago, Indianapolis and St. Louis, distributor of the H.A.L. Mr. Bower has been with exporters of motor cars in New York.

Crow-Elkhart Opens Export Department—Pierre Maas is the export manager in the new foreign department established by the Crow-Elkhart Motor Co. Mr. Maas for eight years was manager of the export business of the Swift Cycle & Motor Co., Coventry, England, and before that was in the motor car business in Paris and Brussels.

Thomas Brothers Open Detroit Office—W. O. and T. R. Thomas have opened headquarters at Detroit as engineering specialists and will act as consulting engineers for motor car manufacturers. They formerly had offices in New York and England and were consulting engineers for the Mercedes company in Germany, the Minerva in Bel-

gium, Laurin and Klement of Austria and Panhard-Levassor of France.

Eisemann Magneto Promotes Mills—P. E. Mills, formerly assistant chief engineer for the Eisemann Magneto Co., has been made sales engineer.

American Oil Products Plant Burns—The plant of the American Oil Products Co., Buffalo, N. Y., has been completely destroyed by fire. The company expects to resume at once.

Auto Products in New Plant—The Detroit Auto Products Co. is located in its new factory at Detroit, where it will manufacture many of the products used in its Ford body equipment, which it recently bought from other manufacturers.

Marvel in New Factory—The Marvel Machinery Co. has entered its new factory in Minneapolis, Minn. The plant has 15,000 sq. ft. of floor space and will enable the company to treble its production of cylinder re-boring machines.

Lane Resigns from Hyatt—Ralph S. Lane, chief engineer of the Hyatt Roller Bearing Co., has resigned to devote his time to the operation of the Bearings Service Co. and the United Motors Service, Inc., of which companies he is president.

Studebaker Employees Become Citizens—From more than a total of 1100 foreigners employed by the Studebaker Corp. in one of its Detroit plants only three refused to become American citizens. Every man of German birth in the plant signified his willingness to become an American citizen.

Crow-Elkhart Has Own Police—The use of so many circus tents and temporary structures to meet the demand for Crow-Elkhart cars has resulted in such a scattering of the company's equipment and property that the Crow-Elkhart Motor Co. employs a police force of its own to protect its plant. Officers of the company have had special policemen

sworn in for this. The men will be uniformed and will work in 12-hr. shifts.

Herst With M. & S.—W. F. Herst has been appointed general manager of the M & S Corp. Mr. Herst was formerly with the Brown-Lipe Gear Co.

Wilson to Harroun Company—N. Wilson has been appointed assistant traffic manager of the Harroun Motors Corp. Mr. Wilson was formerly assistant traffic manager of the Maxwell Motor Co.

Garford Gets Record Order—The Garford Motor Truck Co. has received an order from the New York City department of street cleaning for thirty-four tractors. The amount involved is about \$300,000.

Wisconsin Motor is Building—The Wisconsin Motor Mfg. Co., Milwaukee, Wis., is building a machine and assembling shop addition, 115 by 275 ft. The concern recently increased its capital stock from \$350,000 to \$1,000,000 to provide for the extensions and the growth of the business. The new facilities will be available about July 1, it is expected.

To Make Gasoline Tanks—The Shotwell Pump & Tank Co. has been organized at Indianapolis to manufacture pumps and underground tanks for the handling of gasoline and oils. Charles W. Shotwell is president. Other officers are R. W. Murphy, treasurer; F. B. Fowler, secretary; B. P. Benritze, production manager, and J. H. McConnell, sales manager.

New Position for Budlong—Milton J. Budlong has been appointed general manager for Gaston, Williams & Wigmore. Mr. Budlong is also vice-president of the corporation. Prior to his connection with Gaston, Williams & Wigmore he had been president of the Electric Vehicle Co. of Hartford, president of the Packard Motor Co. of New York, Philadelphia and Chicago and assistant general manager of the Packard Co. of Detroit.

Beloit, Wis.—Warner Mfg. Co.; capital stock, \$50,000; to manufacture and sell motor car trailers, accessories, etc.; incorporators, A. P. Warner, L. A. Avery and M. O. Mouat.

Charleston, Va.—Craig-Alderson Auto Co.; to operate a general motor car business; capital stock, \$20,000; incorporators, C. H. Craig, L. H. Craig, J. H. Alderson, B. C. Alderson and P. J. Newton.

Cochecton, Ohio.—Crowthers Auto Sales Co.; capital stock, \$10,000; incorporators, A. L. Crowthers, Fred Balmer, C. Guy Bevington and E. P. Selby.

Chelsea, Mich.—Chelsea Steel Ball Co.; capital stock, \$75,000; incorporators, T. F. Callahan, C. Lehman, M. J. Dunkel and L. P. Freeman.

Cleveland, Ohio.—Motor Truck Sales Co.; capital stock, \$25,000; incorporators, Henry J. Foster, Herbert Andrews, Ivan Katzenstein, Howard Katzenstein and Earl Katzenstein.

Chicago.—Illinois Auto Truck Co.; capital stock, \$25,000; incorporators, Edward F. Dunne, Jr., and William J. Corboy.

Chicago.—Excel Garage Co.; capital stock, \$5,000; incorporators, J. O. Schack, E. B. Lucius and J. S. Matthews.

Clarksville, Tenn.—Royal Garage & Machine Co.; capital stock, \$10,000; incorporators, J. D. Fraugher, C. W. Rudolph, J. H. Smith, Jr., R. P. Gold and W. A. Chambers.

Cincinnati, Ohio.—Acorn Motor Sales Co.; capital stock, \$20,000; to sell motor cars; incorporators, H. M. Pollock, Claude V. Black, A. L. Quill, J. Laughlin and John C. Harman.

Canton, Ohio.—Garage & Repair Co.; capital stock, \$10,000; to operate a garage and repair shop; incorporators, V. R. Levinger, Robert Goudy, Guy M. Wilson, McLeville Howard and A. O. Evans.

Clevis, N. M.—New State Auto Co.; capital stock, \$15,000; incorporators, L. E. Shaw, S. T. Lawrence, H. A. Miller and C. A. Scheurich.

Detroit.—The Axan-McLean Co.; capital stock, \$50,000; to make motor car parts; incorporators, Frederick Axan, Hugh McLean and Clyde McLean.

Dover, Del.—First National Finance Corp.; to deal in and with motor cars, loan money on security, etc.; capital stock, \$3,000,000; incorporators, F. R. Hansell, O. H. B. Martin and S. C. Seymour.

Los Angeles, Cal.—Peerless Wheel Co.; to manufacture motor car wheels; capital stock, \$15,000; incorporators, F. E. Powers, G. E. Somarodyk and R. A. Armstrong.

Recent Incorporations

Milwaukee, Wis.—Welch Chemical Works; capital stock, \$50,000; incorporators, H. D. Welch, G. R. Colburn and R. C. Almour.

New York.—Perfect Body Co., to manufacture motor car bodies and supplies; capital stock, \$10,000; incorporators, K. Terjath, P. Mary and J. Bander.

Owensboro, Ky.—Franks Tractor-Cultivator Co.; incorporators, W. O. Hoskins, W. L. Morton, James Jones and others; capital stock, \$50,000; to manufacture a tractor-cultivator.

Oklahoma City, Okla.—United States Garage; capital stock, \$50,000; incorporators, H. B. Shanks, E. E. Lucas and A. A. Holmes.

Pawuska, Okla.—Osate Garage; capital stock, \$5,000; incorporators, C. W. Stephens, C. T. Easterbrock and Din H. Anderson.

Philadelphia, Pa.—E. J. Graham Engineering Corp., to manufacture front-drive chassis for motor trucks; capital stock, \$35,000; incorporators, Frederick W. Unger, H. J. Graham and C. Yarnall Abbott.

Racine, Wis.—Western Coil & Electric Co., to manufacture and sell electrical devices, equipment, etc.; capital stock, \$30,000; incorporators, James W. Gileon, William Mitchell Lewis and James V. Rohan.

Racine, Wis.—Western Pattern & Mfg. Co., to manufacture wood and metal patterns; capital stock, \$10,000; incorporators, E. F. Jacobsen, Elmer Beck, Miller Peterson, Oscar Jacobsen and Anton Peterson.

Racine, Wis.—Racine Motor Truck Co., to manufacture, assemble, repair, buy and sell motor vehicles and deal in tools, fixtures, etc.; capital stock, \$50,000; incorporators, Charles P. Piggins, Ira L. Miller and Fred H. Piggins.

Rochester, N. Y.—Giant Tire & Sales Co.; to manufacture tires; capital stock, \$10,000; incorporators, J. M. Johnson, L. E. Johnson, A. L. Dutton, E. F. Gamrod and J. A. Huber.

Rochelle, Ill.—Rochelle Automobile Co.; capital stock, \$5,000; incorporators, W. D. Storer, N. D. Trinter and B. J. Parker.

St. Joseph, Mo.—Robinson Cadillac Motor Car Co.; capital stock, \$10,000; incorporators, Walter H. Robinson, K. W. Robinson, Melvin E. Binswanger and L. J. Binswanger.

St. Louis, Mo.—Kerosene Motor & Tractor Co., to manufacture motor vehicles and trucks; capital stock, \$10,000; incorporators, George P. Weber, James M. Leonard and G. C. Weber.

St. Louis, Mo.—Equipment Motor Truck Co.; capital stock, \$50,000; incorporators, H. J. Dusker, S. M. Laithe and W. A. Yackley, Jr.; to deal in motor vehicles and accessories of all kinds.

Sidney, Ohio.—Sidney Universal Car Co.; capital stock, \$10,000; to sell motor cars; incorporators, Emerson Dean, S. S. Faulkner, C. E. Emerick, William J. Sherrer and Fred Martin.

Sussex, Wis.—Sussex Garage Co.; capital stock, \$5,000; incorporators, John P. Stier, William Brown, William J. Smith, August Manke and W. F. Stuewa.

Sepulpa, Okla.—Western Auto Co.; capital stock, \$5,000; incorporators, B. T. Glover, L. M. Glover and J. A. Ryan.

Two Rivers, Wis.—Two Rivers Plating Works; capital stock, \$40,000; incorporators, Henry Miza, A. Schmulman, Emil Frens and M. Gaffney.

Toledo, Ohio.—Crow-Elkhart Sales Co., to sell motor cars; capital stock, \$20,000; incorporators, B. H. Christian, Joseph A. Riepelle, J. B. Grouch, J. M. Main and F. A. Herman.

Wichita, Kan.—Fast-Oswalt Motor Co.; capital stock, \$100,000; incorporators, Judeon C. Fast, Walter L. Oswalt and Bertha L. Fast.

Youngstown, Ohio.—Sloss Motor and Repair Co.; to sell motor cars; D. M. Strachan, R. J. Powell, B. M. Powell, Henry G. Sloss and M. M. Conroy.

Youngstown, Ohio.—Hoffmaster-Gifford Motor Co., to sell motor cars; capital stock, \$30,000; incorporators, L. P. Hoffmaster, L. B. Hoffmaster, Chas. A. Gifford, A. W. Gifford and Guy D. Ohl.

Seattle, Wash.—Grinwald Auto Supply Co., Inc.; capital stock, \$10,000; incorporators, Edward J. Grinwald, Herbert H. MacGinnitie and George M. Horton.

Texarkana, Ark.—Overland-Texarkana Co.; capital stock, \$25,000; incorporators, J. K. Wedley, R. E. Deve and Putnam Dickinson.

MOTOR AGE

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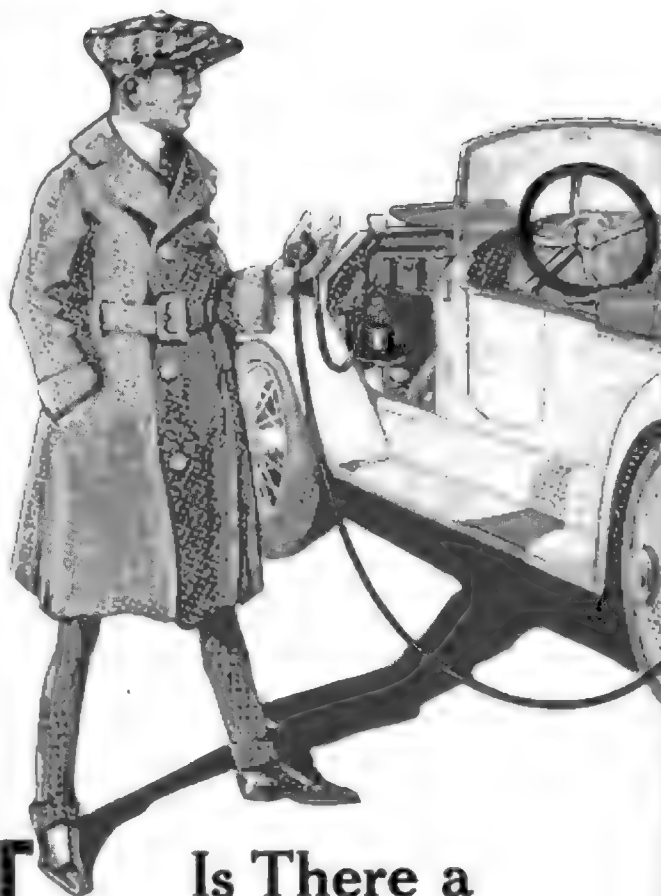
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ANNOUNCEMENT

The feature of Motor Age for next week will be an inside story on the use of motor trucks by the United States army as made in the Pershing expedition into Mexico and on the border. In view of the present situation the story is particularly opportune.



Is There a **KELLOGG** Engine Driven Tire Pump On Your Car?

One experience on the road or about town proves its necessity.

As standard equipment on many cars, dealers no longer speak of it as an accessory. They refer to it as a most important part of their car's equipment.

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Ask him about it or write us direct, giving name and model of car, and we will send literature and advise where installation can be made.

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FORD
HUDSON
HUPMOBILE
KISSEL
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OVERLAND
PAIGE
REO
STUDEBAKER

Dealers equip these cars and many others.

Limits 5 Per Cent Levy on Cars

House Amends Bill and May Discard Tax-at-Factory Plan

WASHINGTON, D. C., May 22—Special telegram—The House of Representatives, sitting in committee of the whole, amended the war revenue bill on motion of Representative Doromus of Michigan by limiting the 5 per cent levy on motor cars, motorcycles and their tires so that the tax would be effective only as to factories paying annual profits above \$5,000 and 8 per cent on capital invested. This amendment was written into the bill by a vote of ninety-six to ninety-two after an effort to strike out the entire paragraph relating to a 5 per cent tax on motor cars, motorcycles and tires had failed.

It has developed that a proposition which was seriously discussed by the Ways and Means Committee of the House, but discarded on the advice of the attorney general that it would not be constitutional, to tax motor cars in the hands of individual owners on proportion to the horsepower, may be advanced in the Senate in lieu of the 5 per cent tax in the house bill. Senator Penrose of Pennsylvania, while not discussing in detail the changes which he will recommend and fight for in the revenue bill, stated emphatically when asked for an expression of opinion that this bill would be revised and practically rewritten in the senate. Mr. Penrose is ranking Republican member of the Senate Finance Committee. Opinion now is general that the senate will discard the 5 per cent tax at the factory plan.

A separate vote may be demanded in the fight in the house either to reject entirely or amend the 5 per cent tax section in the war revenue bill. The section in question has been to provide that there shall be deducted from the tax an amount equivalent to 5 per cent of the amount paid for the tires including inner tubes.

CREATES AIRCRAFT BOARD

Washington, D. C., May 21—An Aircraft Production Board has been created by the Council of National Defense. This marks the complete formulation of the government's aircraft policy and the beginning of the work of carrying it into effect. The general function of this board will be to bring manufacturers together and help make their resources available to the government and assist the government in stimulating the production of better types and greater quantities of air machines. Further, it will investigate and recommend manufacturers' plants where orders are to be placed, aid in arranging with factories as to the kinds of machines best suited to

their facilities for manufacturing and following the selection of sites for aviation schools and supply depots, will advise in regard to buying or leasing the land, preparing it for use and erecting all buildings.

Following a visit to Toronto, Ont., by three technical instructors from the universities of California, Texas, Illinois and Ohio, Massachusetts Institute of Technology and Cornell University, these instructors are prepared to teach aviation, and six engineering schools have been opened in these respective institutions. These cadet schools might be described as laboratory courses in aviation. All applications from persons who wish to become military aviators have been turned over to General Squier's office over which Prof. Hiram Bingham of Yale has been given general direction, and there have been far more applicants than could be admitted. Twenty-five cadets a week are entering each of the six colleges, and it is estimated that there will be 600 cadets in the six colleges by July 1.

Wants 10,000 Cars

Bids Are Asked on Touring and Roadsters by July 8

WASHINGTON, D. C., May 19—That the War Department is expecting to order a great many passenger cars in addition to the truck order developed through the fact that all manufacturers of passenger cars have been asked to submit bids on both touring cars and roadsters in lots of 1 to 1,000. The War Department through the Quartermaster's Corps is negotiating with passenger car concerns for purchasing the cars. This is being done in anticipation of the final approval of the army special appropriation bill and contracts now tentatively made and will be perfected after bids are open for the new fiscal year beginning July 1 next.

Representatives of the Quartermaster's Corps are now visiting the various motor car plants to get a line on capacity of each and to ascertain what each can do when called upon, especially if called upon in an emergency. Inquiries now being made are on a basis of at least 10,000 cars to be promptly ordered. The bids to be opened will call for 40,000 cars to be furnished as asked for.

It is reported unofficially that 7000 passenger cars already have been ordered from

three different concerns but this is not confirmed.

Wants Touring Cars and Roadsters

Chicago, May 22—According to the request sent out from Chicago, which is the headquarters of the central department of the Quartermaster's Corps, bids will be accepted only from manufacturers and not from agents or dealers. Bids are to be opened at 2 p. m. June 8 and then will be forwarded to Washington. Bids are asked on the following passenger cars:

- 1 to 1,000, five-passenger, \$1,000 or under.
- 1 to 1,000, two-passenger, \$1,000 or under.
- 1 to 1,000, touring cars, \$1,500 or under.
- 1 to 100, touring cars, \$2,000 or under.

No awards will be made under this opening of bids, but the offer and the prices are to remain open during the fiscal year, beginning July 1, 1917, purchases to be made by the Quartermaster's department from time to time as required. The cars are to be complete and the prices to be quoted f.o.b. factory. One of the points particularly asked is the time which will be required to ship the cars after the order is placed. The cars are to be inspected by the Government on delivery.

In addition, bids are asked for 70,000 trucks to conform to the new army standards, as follows:

- 1 to 35,000, Type A (1 1/4-ton).
- 1 to 35,000, Type B (8-ton).

Bids for light delivery vehicles are asked as follows:

- 1 to 200, 1/2-ton capacity.
- 1 to 200, 3/4-ton capacity.
- 1 to 200, 1-ton capacity.

Motorcycle manufacturers are asked to bid on 10,000 motorcycles, half with side-cars.

POSTAL RATE TAX COMPROMISED

Washington, D. C., May 21—There already are indications that the Postoffice Department is ready to modify its proposal for a zone rate of postage on newspapers and magazines by accepting a flat rate compromise of 2 cents instead of 1 cent a pound. It has been estimated the zone rate proposed under the Postoffice Department's original plan would have averaged 4 1/2 cents for magazines. A new graduated second class mail zone rate proposal ranging from 1 1/2 cents a pound in the first zone to 5 cents in the eighth has been considered by the committee. There will be a joint conference of representatives of business papers and members of the cabinet next Friday in Washington. President Wilson has let it be known to members of Congress in charge of the revenue bill that he does not favor the second class postage rate increase as embodied in the original bill.

All Set for June Derby Five Consuls to Attend and 3000 Cadets to Storm Trenches

Mercer, Disbrow, Haynes and Hal Enter Dealers' Race

THE possibility that the Chicago motor derby June 16 will be the final speedway race of 1917, in view of the call for many of the drivers and mechanics, who have volunteered for military service, to report at aviation schools and training camps for army chauffeurs in July, is a great incentive to the plans of the speedway management to make of the event a patriotic meeting in keeping with the times. Five nations will be represented at the derby through their consuls: Great Britain through Horace D. Nugent; France through Antonin Barthelmy; Italy through Count Giulio Bolognesi; Belgium through Dr. Cyrille Vermeren; and Russia through Antoine Valkoff. These men have been asked to serve on the executive committee which will distribute the war cause fund received from the military and motor events that day.

Dealers Have Entered

The non-professional race has aroused much interest. The first entry blanks were for two Mercers, a Disbrow Special, a Haynes and a Hal Twelve, and the entry of a Cadillac team and a Stutz team are expected, while others are considered probable. William A. Leet, Manning, Iowa, winner of last year's amateur race with a Mercer, has been invited to defend his laurels. Al Schillo, Chicago, who captured first in the 1916 dealers' event, has challenged F. D. Saupp, Pittsburgh, Pa., whose Peerless led at the end of the 112-mile for dealers at Uniontown recently. Andrew Ortmeyer, whose National car carried the colors of the Chicago Athletic Association in the amateur last year, has applied for leave of absence from the government aviation school he is attending to race his Mercer.

David F. Reid, president of the Speedway Park Association, is confident of as many starters as the classic a year ago, when Starter Fred J. Wagner sent away twenty-one cars. Entrants waiting to sign entry blanks include the Hudson company with Ralph Mulford and Ira Vail as drivers, Barney Oldfield, Earl Cooper, Eddie Hearne, Otto Henning, Ralph de Palma, J. C. Hoskins, who has engaged Dave Lewis to pilot his Deussenberg, and Billy Taylor, first at Uniontown May 10.

INDIANAPOLIS PLEASES PARIS

Paris, May 2—Although coming as a surprise, the decision of the Indianapolis Motor Speedway company to postpone racing until after the war meets with hearty

approval in French motoring circles. There is a proposal afoot to induce the Automobile Club of France to take disciplinary measure against race drivers who have not fulfilled their military engagements or who have taken advantage of their legal situation to continue racing during the war. There is a precedent for this in the case of a racing cyclist who was free from military service owing to some slight physical defect and consequently took part in the New York six-day bicycle race. The body controlling bicycle racing in France considered that it was the duty of such a man to volunteer for service, and because he did not do so life disqualification was imposed.

NO 1917 RACING CHAMPION

New York, May 18—The contest board of the American Automobile Association has decided against holding the 1917 racing championship on account of the few speedways that will be active. It has allowed Aitken's 100-mile record of 56:37.65, made in his Peugeot at Sheephead Bay Oct. 28, 1916. As a result of war conditions, the Oldfield dinner in Cincinnati has been postponed temporarily.

CHANDLER PRICES UP \$200

Cleveland, Ohio, May 21—The Chandler Motor Car Co. will raise its prices \$200 on June 30. On that date the seven-passenger touring car becomes \$1,595; the four-passenger roadster becomes \$1,595; the seven-passenger convertible sedan, \$2,295; the four-passenger convertible coupe, \$2,195; and the limousine, \$2,895.

TO SOLVE TIRE PROBLEMS

New York, May 18—A tire manufacturers' division of the Rubber Association of America is to be organized. Representatives of about forty of the principal tire companies approved such a move at a meeting held yesterday. H. S. Firestone, president of the association, presided at the meeting, which also went on record in favor of adopting a standard contract clause covering fluctuations in the prices of tires. This clause provides that if the manufacturer finds it possible to reduce prices to the dealer, he will give the dealer the benefit of the reduction; similarly, if the manufacturer increases prices, the dealer is to have the choice of accepting the balance of unfilled contracts at the advanced price, or of cancelling the balance of the contract.

MORE RACERS FOR CINCINNATI

Cincinnati, Ohio, May 19—To date a total of thirty cars have been entered for the Decoration Day race at Cincinnati. In addition to those already named in MOTOR AGE, Barney Oldfield, Earl Cooper, Andy Burt, Dave Lewis, Louis Chevrolet, George Buzane, Otto Leisy, Jr., Billy Chandler and Eddie Rickenbacher have entered. Qualifications trials, at which a minimum speed of 90 m.p.h. must be made, will take place next Saturday.

Relay Run Reaches K. C.

Jefferson Highway Officials and Prominent Canadians Are Making Long Trip

Drive From Winnipeg to New Orleans on Rigorous Schedule

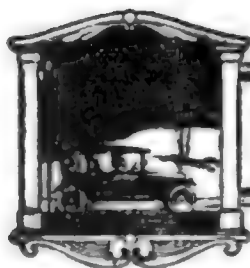
KANSAS CITY, Mo., May 21—Significance of the Jefferson highway, both nationally and internationally, as a military road of advantage was proven by the arrival here of the members of the relay-sociability run from Winnipeg, Man., to New Orleans. While the members of the party do not say that the highway now is in condition to bear heavy military traffic throughout its length, the possibilities of its use in an emergency are there, with the spirit and organization to carry out the task. Three cars, bearing officials of the road and public officials of the Dominion, left Winnipeg May 14 and have been joined by hundreds of cars along the way for a part of the trip. As the first official car reaches a town the speakers in that car make short addresses and when the next car approaches the first one leaves so that at times speeches are going on in two or three towns at one time.

Hon. T. C. Norris, premier of Manitoba, is the guest of honor on the trip. To every community through which the cars and party has passed the realization has come to the residents that the Jefferson highway is a road over which soldiers and supplies could be moved promptly in emergency. By keeping close to schedule officials of the highway believe they will demonstrate to the government the feasibility of making this road a military highway. The run will continue to New Orleans, and a return trip will be made in June.

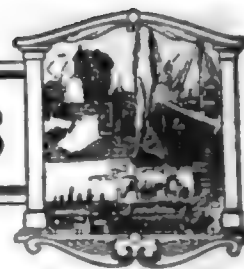
GOODRICH ON 24-HR. SCHEDULE

Akron, Ohio, May 19—The B. F. Goodrich tire department is producing close to 30,000 tires a day. As a result this department is working on a 24-hr. day schedule. Continuous relays are run from Sunday midnight until midnight Saturday.

Earnings of the company are running about even with a year ago. For the twelve months ended Dec. 31, 1916, net was equal to \$12.76 a share for the \$60,000,000 common, after the preferred dividends, as compared with \$17.17 a share in 1915, and \$5.50 a share in 1914. Tire contracts with the car makers are running a little lower than last year. As a result the company is in a more fortunate position as regards taking care of its direct trade requirements, which are heavy, and then again, any contracts with makers at the lower prices are naturally burdensome just now. The expansion program has been completed, and there is little likelihood of any further heavy expenditures for plant additions for some time.



EDITORIAL PERSPECTIVES



Taxing Cars and Cosmetics

MOST illogical of the many illogical features of the motor car tax measure approved by the Ways and Means Committee of the House of Representatives is the fact that it is assumed to be collected only on luxuries, along with face paint, rouge, powder, etc. The members of that committee do not recognize the motor car as a necessity product and many of them refuse to be shaken in their opinion on this point.

✱ ✱

NEW proposals are coming up each day regarding the 5 per cent tax and there can be no prophecy as to whether or how much it will be modified. The latest proposal—at this writing—is to limit the tax to concerns whose profits exceed 8 per cent a year.

✱ ✱

ONE feature of the bill, hitherto undiscovered, is that as at present written, the 5 per cent tax also applies to cars in the hands of dealers for resale. This means that the cars that dealers have stored during the winter for summer sale would be taxed 5 per cent. In this way the bill would reach several months into past history and impose the 5 per cent tax on the foresight of dealers who bought cars for this summer's business.

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THE bill also is so drawn that it might be stretched to cover used cars in the hands of dealers. If this were done, it would be tragedy itself, because the cars, as a general rule, represent to the dealers nothing except a loss and the 5 per cent tax would more than wipe out the profits of hundreds of dealers and distributors. Dealers' associations and individual dealers throughout the country are being urged to get in touch with their congressmen and tell them the damaging effect the passage of the bill will have on the motor car business.

✱ ✱

UNTIL last week little has been known of what the Government intended to do in the utilization of the thousands of passenger cars America produces. With the call for bids from manufacturers of these vehicles, however, we get an inkling of the plans of the army. It is probable that these will be used for staff officers, etc.

THE present European war is essentially a motor war; motor apparatus is conveying the troops from point to point; motor ambulances have superseded horse ambulances; armored motor cars are operating in night raids, and in reconnoitering work; motor trucks are moving the heavy field artillery; motor apparatus is moving the huge field guns and siege guns; motor apparatus in the air is doing work impossible otherwise; in fact, the entire war is a motor war.

IF the bill is passed, it will put many manufacturers out of business and if an effort is made to pass the tax along to the public through the dealer, the dealer will have to take it out of his profits or collect it from the car buyer. Any attempt to collect from the buyer of the car will obviously slow up sales, which are not very brisk as it is, and the net result will be a loss of such proportions that hundreds of dealers would suffer immeasurably if not being forced out of business entirely.

✱ ✱

IN the Senate the arguments presented by representatives of the National Automobile Chamber of Commerce, by individual motor car manufacturers and by others interested in the industry to the Senate finance committee are said to have made a distinct impression. The feeling among members of this committee is said to be that motor car and accessory manufacturers will be bearing all of their fair share of the war burdens when they satisfy the income tax requirements, the excess profits tax, and place their entire resources at the disposal of the government in the making of cars, trucks, motors, or munitions of war, generally.

✱ ✱


WISER ones among the law-making forces are realizing that the motor car industry occupies a position with respect to the national defense unique among the industries of the country. The war in Europe, and the expedition into Mexico by an American army, together with the operations of federal troops along the border all have made plain to the members of Congress, the army officers, and the laymen the vital need for keeping the motor car industry in this country at its best, and for encouraging it instead of putting obstacles in its way in the shape of legislation which would certainly prove destructive.

✱ ✱

Army Staff Cars

FRANCE found that army trained men who perhaps had never sat in a car till they went to the war drivers' school to be taught made better drivers eventually than the civilian drivers or those who had been civilians. England's bus operators, who were accustomed to working on schedule and had acquired the habit of strict discipline, were among the few civilian drivers who were a quick success.

IT has been said many times that the motor vehicle was the salvation of Paris, and this is true. By pressing into instant service every vehicle that could be obtained by organizing a transport over night practically, the German tide was turned almost at the city gates of Paris, but had Paris or the French army had the proper complete transport system in shape and in operation, in all probability Paris would never have had to be saved by such last-minute methods.



Practical Preparedness

Intelligent Pessimism a Requisite

WAR is life lived at its tensest! In war, as in every other activity of life, nothing wins but dogged endurance and work—work—work. Our country has billions in resources. We are told almost continually that our wealth in every phase exceeds that of almost all of the other countries combined. This is well for the country, but our vast resources are not going to win in our war with Germany except as they are intelligently applied. By this is meant our resources in the broadest sense—man power, food production, monetary power, patriotic spirit and everything else that comes under the head of resources in any way. When we swell with pride as our wonderful natural resources are mentioned it will be well to remember that our resources must be marshaled and drilled to the highest state of efficiency possible. Pride will not win for us the place that is ours in democracy.

HOPES for success pinned to our resources without intelligent thought and mobilization of men and minds are no more valuable than our navy would be without officers or crew. We can and should find an example of what we must do in the statement made by Rear Admiral Bradley A. Fiske with reference to the navy. He says: "The highest type of mechanical science finds its expression in the ships of our navy . . . but the navy is not ships; it is men. Without men, our modern dreadnaughts are inert masses from which we may expect nothing." It is so with our enormous resources. Properly applied they can be made to win the war; left dormant they cannot bring us success.

THIS is a time for intelligent pessimism, for the kind of far-sighted vision that England did not develop until she had been in the war for a whole year. As was so frequently heard in England at the beginning of hostilities: "We know nothing about fighting and by the time we could train ourselves the war will be over," so we hear the same expression here. It is our hope that Germany will concede the rights of humanity soon. It is our hope that the war will be over within a few months. It is the prime thought in many minds that mere contemplation of our vast resources will discourage the enemy and that it will give up in despair. We shall do wisely if we put these hopes aside and enter the war, not as we have every other war with an expectation of the best, but enter with full preparation for the worst.

THE plaudits of Britain, France, Italy, Russia and Japan when we decided to enter the war was a sop to our pride. It was like a man who had no friends suddenly becoming popular. We liked the acclaim of course. Just in proportion as our preparations for active service drag along—as drag they always do under democracy—we are going to be criticised by our allies as England was criticized by hers. It will call for the utmost in statesmanship, hard work and patience to hold this big, unwieldy alliance together until the war is won. America should go into the fray as if she expected to win it single-handed. Foremost in our minds should be the thought that if Russia should make a separate peace, Mexico become antagonistic, or if the British should be weakened through

the submarine menace we should gird ourselves now to see the thing through to a successful conclusion.

WE have only to look back, thumb the pages of American history, to find the disadvantages of unpreparedness. The American Revolution was the most haphazardly fought war in the history of the Christian era. Men were enlisted for periods of three months, six months or a year. They fought but a little while; then their service was completed and they went home at critical moments in the operations. The Revolution lasted seven years. In all nearly 400,000 men were enlisted to fight a British force of 150,000. Washington, at Valley Forge, could muster but 10,000 to 15,000. He complained much of the inefficiency that rendered his efforts futile. Only two engagements of the whole war were of real military advantage to us and the last and largest would have been utterly impossible had it not been for the French troops and fleet.

THE Battle of Blandensburg in the War of 1812 showed the inefficiency of our army. Fifteen hundred British troops defeated four times their number of American troops. Why? Because they were prepared and directed efficiently. Americans were sure of their success in this battle, but the dinner prepared for our victorious troops was eaten by the British and the next day they burned the capital.

VOLUNTEERS for the Civil War were called for ninety days. This was to be a three months' holiday with gold braid, honor and glory and a Thanksgiving dinner at home. It dragged along for four years, cost thousands of lives and thousands of dollars of property destruction that might have been saved had they prepared for a life-and-death struggle at the beginning. Some omnipotent power, such as opened the Red Sea and engulfed the Egyptians is not going to open the Atlantic Ocean and with a mighty sweep eradicate Germany's submarines for all time. We have the men, the money, the brains and the ability to win this war alone if we marshal all our talents and get the right perspective, but all our riches are not going to intimidate such a foe as Germany. This should be plain when she has so long weathered the storm of the world against her. To win we must fight and to fight efficiently we must be prepared and our preparedness should be of a high standard.

Engines for Heavy Oil

Construction in Germany of
Junkers Gives 1 hp. for
3½ lb. Weight

Development Said to Promise More
Than Kerosene Devices

NEW YORK, May 18—Passenger cars, motor trucks, and even airplanes, yet may be propelled by heavy-oil, high-compression engines such as the Diesel. In fact, a Junkers engine of this type already has been constructed in Germany and has given 1 hp. for every 3½ lb. of weight. This is the message which Henry G. Chatain of the General Electric Co. brought to the monthly meeting of the Metropolitan Section of the Society of Automotive Engineers last night.

Mr. Chatain stated that although present types of these engines are not suitable for road and air propulsion, there is no really inherent reason why an engine of this kind could not be built and operated successfully. His paper was entitled "Treatment of Hydrocarbon Fuels" and was essentially an analysis of the manner in which heavy fuels are converted into energy in the cylinders of an internal combustion engine.

If such an engine is to be produced, Mr. Chatain pointed out, it will require that the basic principles underlying present types be studied, and carried out in the proper manner, and that a careful study be made of all mechanical parts and very likely that devices for converting the fuel into a gas be redesigned. Two of the things which will accelerate the development of these engines will be that they operate on ½ lb. of fuel per break horsepower hour and that the price of fuels is tending to increase.

Paper on Junkers Design

Philip Lane Scott had a paper on the design and construction of the Junkers engine. This is a Diesel type having two cylinders to each piston with the gas expanding between them and thus driving a three-throw crankshaft through suitable external connecting-rods or gearing.

Both Mr. Scott and Mr. Chatain seemed agreed that there are far greater possibilities in the development of a Diesel type or semi-Diesel type of engine for road and air propulsion than there is in the development of devices for the use of kerosene in the present engines or engines slightly modified to use this fuel.

With regard to alcohol, Mr. Chatain stated that we had not made any experiments with this fuel for the reason that there had been no wide demand for it. He stated further that, owing to existing laws which require that denatured alcohol remain in bonded warehouses for a considerable time, the small producer virtually

is cut off from this market. Until these laws are amended it is entirely too expensive for small producers to turn waste material into alcohol. He offered as his opinion that the only way to use kerosene efficiently is to employ some device which will convert it into a fixed gas rather than a fog. With the fog, he stated, it is not possible to obtain a sufficiently complete degree of oxidization for efficient combustion; a good device would have to operate much like a gas producer.

The kerosene carburetor that is essentially the same as a gasoline carburetor, he said, is entirely inadequate, for the reason that applying heat in the manner it is now applied reduces the efficiency of the engine by decreasing the volume of mixture which is inspired. It was suggested that a more logical solution of the problem appeared in the distillation of crude at a somewhat higher temperature so as to utilize much of the content which now comes off in the form of commercial kerosene.

NEW RANK FOR MILITARY TRUCKS

New York, May 18—The War Department has granted the request of the standards committee of the Society of Automotive Engineers that it change the naming of the two military trucks, and hereafter the 1½-ton army truck will be known as military truck Class A and the 3-ton will be called military truck Class B. The change was desired because the trucks specified have to carry more than the nominal loads and are in every way heavier and larger than 1½- and 3-ton trucks should be built for commercial service.

COFFIN ON MUNITIONS BOARD

Washington, D. C., May 18—Howard E. Coffin has been named chairman of the industrial committee of the general munitions board created by the Council of National Defense.

SUPREME MOTORS CORP. FORMED

Cleveland, Ohio, May 18—The Supreme Motors Corp. has been incorporated for \$1,000,000 to make three types of engines, a twin-six, a six and a four. It has absorbed the Davis-Mitchell Engineering Co., this city, which has been doing the experimental work. Courtney N. Mitchell is the designer. B. J. Cline, formerly with the Chandler and Elgin, has been made production manager. Experimental work is under C. E. Manning, for three years with the Continental Motor Co. The four-cylinder engine is for trucks and tractors, while the others are for passenger cars. The officers are: President and general manager, C. F. Jamison, formerly with the Saxon and Elgin; vice president and treasurer, Charles H. Davies, organizer; vice president and director of manufacturing, B. J. Cline; secretary, William J. Lavery; director of engineering and purchasing, C. N. Mitchell; assistant chief engineer, C. E. Manning.

Antipodes Buy U.S. Cars

Foreign Agent Says New Zealand and Australia Have
72,000 Cars

Era of Road Building to Boom
American Sales

DENIED the product of the mother country, antipodal motorists, in fact and prospectives, are buying American cars in greater quantities than ever before. Now, these people show greater inclination toward American products than was true two months ago. Then they were buying of a neutral; to-day they are buying of an ally. This is the substance of a statement made to a MOTOR AGE representative by J. B. Clarkson, managing director of Hope Gibbons, Sons & J. B. Clarkson, Ltd., Wellington and Christchurch, New Zealand, who is in America to purchase motor cars, motorcycles, accessories and tractors, which his company distributes in New Zealand and Australia.

New Zealand and Australia have one car for each 100 persons, approximately, and the ratio is the same in each country. New Zealand with about 1,200,000 population has about 12,000 cars, while Australia with approximately 5,000,000 people has about 50,000 cars. Very few closed cars are found in New Zealand since the climate is mild and the winter season there consists of about four months of rainy weather.

Cars Cost More There

There has been a strong movement for better roads in this country in the last few years, especially since the motor car came into existence and now the island may be traversed from north to south with little difficulty, although there are sections of the "bush," as the New Zealand thickets is termed, that are almost impenetrable. Motorists of this country know nothing of the taxation placed on motor cars in America. Naturally they have to pay high for American cars—a Ford there sells for between \$900 and \$1,000 and the cars that we can buy in the United States in the \$1,000 class cost approximately \$2,000 in the antipodes. However, once a car is purchased, there is no further taxation. The high import duty and the high freight rates are looked upon by the commonwealth as sufficient for the motor car owner to pay. He gets a set of license plates for 60 cents and that number is carried indefinitely. No one pays taxes in New Zealand except land owners. Personal property tax is unknown.

Traffic congestion has not made itself felt in New Zealand. Mr. Clarkson says he never saw a car in his country equipped with a bumper. English-made cars come into New Zealand under a 10 per cent import duty, while American cars carry a 20 per cent tax. Since the war, of course, there has been no importation of English cars because their production ceased. Mr.

Clarkson says he now has orders for 1000 British cars for delivery as soon as possible after the war is over.

Some of the American car makers have their own branches in New Zealand, although there are a great many cars sold there by resident dealers. As might be expected, because of the high freight and import tax rate, our low-priced and medium-priced cars find the most ready market in New Zealand, consequently there are few of our more expensive cars to be found there. The cars of this class have come from European countries in the past, partly because of lower freight rates, partly because of lower import tax and partly because of the country's affiliations. There was a growing feeling against America and American products prior to the first of April, but now all this has changed, according to Mr. Clarkson.

Mr. Clarkson made the statement that with the era of road building coming strong in New Zealand and being conducted under scientific principles of engineering, he looks for sales of motor cars, especially American makes, to boom. Especially, he says, the tractor is finding its place in the fields. The country is chiefly a stock and grain raising country and there have been rapid strides toward mechanical tillage of the soil recently which presage almost universal use of the tractor within a few years in New Zealand.

OLDS IN BURGESSSES CORPS

Lansing, Mich., May 17—R. E. Olds, president of the Ree Motor Car Co., has been elected a life member of the Burgessses Corps, to fill the vacancy caused by the death of former governor Curtis Guild, of New York. The Burgessses Corps is the oldest military organization in this country, and has honored many famous men, including rulers of other lands. It was organized originally in 1691 to defend the colonists at Albany, N. Y.

MECHANICAL ENGINEERS TO MEET

New York, May 19—The American Society of Mechanical Engineers will hold its spring meeting in Cincinnati, Ohio, May 21-24. Two important features of the meeting are the sessions on the manufacture of munitions and with the National Machine Tool Builders' Association.

A. A. A. MEETING MAY 25

New York, May 19—The executive board of the American Automobile Association will hold the annual meeting of the board of directors at the Hollendon Hotel at Cleveland, Ohio, May 25.

BIMEL PLANT SOLD

Sidney, Ohio, May 21—The American Motors Parts Co. of Indianapolis has purchased the stock, machinery, and so forth, excepting the finished cars, of the Bimel Automobile Co. of this city, at the Bimel auction sale. The American Motors Parts Co. bid \$15,715.

New Bureau for Gibson

Accessory and Garage Engineering Experts to Aid Customers

Plans to Benefit Small Dealers' Business

INDIANAPOLIS, Ind., May 19—The Commercial Development Bureau of The Gibson Co., wholesale accessory distributor, recently launched with an invitation to customers of the company to avail themselves of knowledge possessed by engineering experts of the firm, on methods for improving business operations, is meeting with a hearty response from the trade.

Although the bureau has been in operation only a few months, it has received many applications for expert advice on various phases of the accessory and garage business. The results obtained in this brief time have convinced the company the average dealer is eager to place his business upon a sound basis—all he wants is to be shown how.

The plan adopted by the bureau is to supply to customers of the company without charge direct counsel on all subjects relating to the trade. If a man is just entering the business, the company will furnish him not only with detailed plans for erecting a building, arranging his stock and equipment but will provide a plan which may be adopted for the efficient transaction of the business itself.

Plan Aids Small Dealer

The plan reaches the small dealer who needs to be lifted out of the rut. His storeroom is unattractive, and all he needs is to follow out some definite plan of action for injecting real life into his enterprise. The work of the bureau is designed to be of help to the successful merchant who wants to expand, but who before enlarging his field of activities desires to have some plan that has been tried out by someone else with success.

The bureau is not dealing in generalities, but is giving direct counsel that will produce results if followed out. Each case is taken up individually, and an expert gives his time to working out a solution to each problem presented. If the storeroom is run-down, the expert shows how, through the use of wall-boards and panel effects that the storeroom can be converted at small expense into a place of business where customers will not have to offer any apology for visiting. Stocks are arranged in the most convenient and attractive fashion, still with the idea of economy of space in mind. The opportunities for window display are pointed out, and in fact every element entering into the make-up of a model shop is given consideration.

The bureau is endeavoring in each case where a garage plan is involved to devise a plan that will economize in time. This

idea is applied in the location and operation of machinery. Each piece of equipment has its place. As an illustration:—the bureau holds that the air compressor should be driven by an independent motor. It is used more frequently than other machinery, and consequently with individual motive-power it can be operated more economically than if attached to a central line shaft, where other machinery would have to be operated each time the compressor is put into action.

The Gibson Co. is in its nineteenth year of operation, and the company simply is offering to the trade the wealth of information that has been acquired during this long period of existence. The company knows what to do and how to do it, and is willing to share the information with its customers. The real foundation for the inauguration of the bureau is that the success of the dealer means the success of The Gibson Co.

In addition to the development of its own plant in Indianapolis the company has aided in the construction of a number of privately owned stores in various localities. The company is to move shortly into a new \$500,000 building which has been pronounced one of the best designed of its kind. Along with the bureau activities, the company publishes each month *The Gibsonian*, a dealers' organ, which has as its principal object the advancement of the trade.

MACON PLANT BURNS

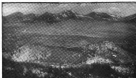
St. Louis, Mo., May 21—The plant of the Macon Motor Car Co., Macon, Mo., was totally destroyed by fire Thursday morning. The loss is placed at \$225,000. Friday the attorney for the company asked that a receiver be appointed. The assets listed in the application were: Uncollected insurance, \$17,500; factory site, \$2,500 and prospects of a suit against the Wabash railroad. The latter is due to the fact that the factory is alleged to have caught fire from burning railroad property, which is said to have been fired by a passing engine.

The Macon company expected to assemble a machine to cost about \$1,000. None had been turned out, but the parts had been delivered to the plant, the machinery installed and the first machines were to be put on the market within a few weeks. The company was organized about a year ago and took over the plant and assets of the All-Steel Motor Car Co., but discarded the all-steel car idea.

MUNCIE STRIKERS AT WORK

Muncie, Ind., May 21—Striking workmen gradually are returning to work in the motor car and parts manufacturing plants, where 3000 machinists walked out two weeks ago when they were refused an 8-hr. day, a 20 per cent increase in wages, recognition of the union and time-and-a-half for overtime.

Some of the manufacturers met a part of the demands of the men. The plant of



They look clean enough for my walking, show the trailer took some time to make the journey.

Trailing a Trailer into the Rockies

By W. A. LIPPMAN

EXCEPT for the broken wheel trailing the car over boulders, we fairly well retraced the path of history, following the ancient Indian's footprints, a road-trail that leads from the Indian Trail Highway, where it was located in the passage from Kansas City to Denver, just through territory not so thick. It worked. The trail, it's said in historic books, led from the mouth of the river and the mountains from the Lincoln Highway, which passes about thirty to the north, ending through Wyoming and Colorado. The trail was really a following road, as we called it, that passed along the river, ending near the mouth of the river, where it was said to be the end of the trail. The trail was really a following road, as we called it, that passed along the river, ending near the mouth of the river, where it was said to be the end of the trail.

Actually the distance added to the end of the trail is that of our trip, as we found the road end of our trail, where we had been constructed to pass the river with a good stream of 10 ft. approximately high for all military purposes. The end of the trail is that of our trip, as we found the road end of our trail, where we had been constructed to pass the river with a good stream of 10 ft. approximately high for all military purposes. The end of the trail is that of our trip, as we found the road end of our trail, where we had been constructed to pass the river with a good stream of 10 ft. approximately high for all military purposes.

In Three Parts—Part II

packed in the snow. They are general landscape were represented in the shape of a rocky trail, leading across the river, where it was said to be the end of the trail. The trail was really a following road, as we called it, that passed along the river, ending near the mouth of the river, where it was said to be the end of the trail.

have been made or have been made in the shape of a rocky trail, leading across the river, where it was said to be the end of the trail. The trail was really a following road, as we called it, that passed along the river, ending near the mouth of the river, where it was said to be the end of the trail.



The modern goods vehicle, heavy duty, set for the night. Note the snow-covered trail, the bridge is high.

the remarkable record is attributable to Mr. Lee who:

Regulated the right to discharge workmen.

Adopted a standard 8-hr. workday with the same wages as applied to the 9-hr. day.

Instituted a permanent day force.

Placed the newer workers in a night force.

Demanded 85 per cent glass in the factory walls.

Cared for the health of the employees.

Developed the Firestone Park for homes for workers.

Sold homes to the workers at cost.

Demanded the \$350,000 clubhouse.

Aided the workers to purchase Firestone stock.

Not a Firestone man can be discharged without the authority of the superintendent of labor. There was a time, in the past, when every foreman had the power to hire and fire, and many workers were discharged because of petty spite, jealousy or anxiety to display authority. That appealed to Mr. Lee as an injustice. He took the authority of discharge from foremen and placed it with department managers. Here, too, he found the same evils. Men were discharged because of personal enmity and for other than justifiable reasons. Again, he moved the right of discharge. This time it was vested in just one man—himself—and to-day no one among the more than 11,000 Firestone factory employees can be discharged except by the superintendent of labor.

Wanted Contented Workers

Three years ago he turned his attention to the day and night shift plan by which Firestone workers operated. The men worked two weeks by day and then two weeks by night, which is about the same plan that most motor car and tire makers follow. The plan seemed to him to be injurious. He could not understand how a man who passed two weeks at night work and the following two weeks at day labor could be a healthy, happy and contented worker. Working by day and then changing to work by night, he felt, was certain to injure the worker's habits, produce restless sleep, harm the health, work discord in the home and ruin the ability for work.

He revolutionized the system. First, he adopted an 8-hr. day with the same wages as were paid for 9 hrs. of work. Second, he put a priority rule into effect which provided that the day shift was permanent and that as rapidly as there were vacancies in its those men who were longest with the company would be selected from the night shift. Once a man was made a member of the day shift he was assured that his transfer was permanent. The result was gratifying. It produced the wonderful decrease of labor turnover and vastly increased the contentment and productive capacity of the organization.

Five years ago Mr. Lee asked the officers for a clubhouse for the employees, explaining the need for a common meeting place

where the men could mingle, bathe, play, read and become a body of friendly individuals. He had difficulty obtaining a swimming pool without the clubhouse. The idea was too new, and the employers struggling, then, with mechanical equipments and chemical formulas thought the human element was something apart from a factory.

NOTABLES TO TALK TO S.A.E.

Washington, D. C., May 21—The summer meeting of the Society of Automobile Engineers, to be held June 25-26 in this city, gives promise of being a very important meeting, in spite of its being but two days. The meeting is going to serve to bring government officials at Washington together with the S.A.E. members, which is very important at this time. This means not only bringing engineers of the motorcar and truck industry together with the government, but also engineers connected with aviation, farm tractors and motorboats. The meeting will be the first big get-together of engineers representing all of these arms of the industry since the name of the society was changed from Society of Automobile Engineers to Society of Automotive Engineers.

That the government attaches considerable importance to the meeting is shown by the fact that Secretary of War Newton D. Baker has accepted an invitation to speak at the informal dinner at the New Willard Hotel, Tuesday evening, June 26. In addition C. B. Baker, head of the quartermaster's department of the army, also will talk. It was under his direction that the specifications for 1½ and 3-ton military trucks were arranged.

Wing Commander I. W. Sedden, R. N. A. S., who is a member of the British Commission in this country, and who is demonstrating some of the British types of war airplanes here, will present a paper dealing with airplane manufacture. Commander Sedden has had much practical experience on the Somme front.

Major Rees, also of the British Commission, and an experienced British aviator throughout the entire Somme campaign, will tell what airplanes of different types are actually called upon to do.

Motor trucks in the European war are being handled by W. Owen Thomas, consulting engineer of Detroit, and who for over two years was head of military motor transport work for the Canadian government and was on the French and British front for fourteen months.

H. L. Horning, of the Waukesha Motor Co., is preparing a practical paper on farm tractors.

The motor boat end of the S.A.E. will be represented by Henry R. Sutphen, vice-president of the Submarine Boat Corp., who will give an illustrated talk on standardization methods used and production plans in building the 500 submarine chasers which this country built for the British government.

Last year the company erected the clubhouse at a cost of \$350,000—around the swimming pool. This year it voted to give Mr. Lee \$1,000,000 to spend for the benefit of the workers as he sees fit. He is delighted with the opportunities the appropriation develops for him, and though he says that he "feels like Brewster and doesn't know just what to do with the money," he will no doubt find several means of spending it to the satisfaction of the Firestone officials and employees.

In addition to these features, Mr. Lee has supervised completely and promoted the plan whereby the employees are enabled to buy homes on a cost basis without an initial payment and to purchase the common stock of the company at prices far below the current market quotations by making small cash payments from their weekly earnings.

When asked why he believed he was successful, Mr. Lee said, "I merely set a goal to do as much good for others as I possibly could."

And he has—not only for employer, but also for employees. His reputation about the Firestone plant is summed up in a short description given by one of the men who said, "Whatever he does goes right." He has the ability and the energy and the eagerness to do things.

His Early Career

His industrial career began when he went to work as a sub-conductor for a Cincinnati street railway for \$5.12 a week with working hours from 6 a.m. to 11.24 p.m. He was already married and says he does not care to recollect just how he and his wife managed to exist. It was but a short time, though, when he was made a conductor and received \$12 a week steadily. From that position he graduated rapidly through the jobs of supervisor, grip-car driver, superintendent and, finally, general manager. Other cities then took notice of him, and flattering offers took him to the management of street railways in such localities as Baltimore, Md., and Washington, D. C., until the Firestone Tire & Rubber Co. called him to organize its industrial service department.

Mr. Lee was born at Baltimore in 1867. He is still a very young man. It is very likely that he will, with his ideals and energy, perform many more wonderful things in the industrial world, but it is improbable that he will ever be able to erect a more happy, efficient and loyal organization of workers than he has wrought at the Firestone plant. His success with men may be summed up briefly—he merely has been a very human being; a man who has a remarkable memory for names and can call his thousands of employees by their first names; who tries constantly to do good and calls justice good; who despite a remarkable success never forgets that he is merely a man and as he says it, "is only as good and no better than the most ignorant worker in the plant insofar as rights are concerned."

Interesting Trips Out of Detroit

Motor Car Metropolis Offers Diversified Week-End Tours Over Good Roads

HISTORICALLY Detroit and southeastern Michigan are perhaps as interesting as any other American communities with the possible exception of Boston and Philadelphia. It was on the site of the city of Detroit that many of the interesting happenings in connection with the early history of America and the northwest territory occurred.

Though not many Americans realize it, Detroit is one of the few big cities of the United States that has been under three flags since the coming of the white man to America's shores. The French were first to settle on the site, Antoine de la Mothe Cadillac founding a French trading post and Fort Pontchartrain in 1701. Later the city passed into British hands and finally to the United States. It was captured by the British in the War of 1812, but was restored to the States at the war's conclusion.

Fort Gratiot

Port Huron, the site of old Fort Gratiot, is another interesting point. Other nearby towns and cities well worth visiting include Pontiac, Mount Clemens, Monroe, Flint, Ypsilanti and Ann Arbor. While the motor tourist seeks first of all beautiful scenery and good roads, he also enjoys visiting historical points. In these Detroit and vicinity abound. A drive along the Detroit river and Lake Saint Clair shores from Detroit to Mount Clemens or points beyond is enjoyable. Trips to the lake regions of Oakland county and Washtenaw county are also interesting.

Within a radius of ten miles of Pontiac there are twenty-five or more lakes, the shores of which are lined with summer cottages. Orchard, Pine, Cass and Walled lakes are among the principal bodies of water around Pontiac, in Oakland county. Good gravel roads and some concrete highways are to be found leading through the lake country. Another group of lakes are to be found north of Ann Arbor, Whitmore and Island lakes being the largest.

Several one-day trips out of Detroit can be arranged. One that is enjoyable is that to Mount Clemens, via the shore route through Grosse Pointe, the millionaires' colony of Detroit. This gives the tourist a chance to see Detroit's famous park, Belle Isle, and Waterworks Park, and to view the broad expanse of Lake Saint Clair. From Mount Clemens the route leads west through Utica to Pontiac and from the latter city south into Detroit, making a trip of approximately 100 miles.

Another one day tour is from Detroit out

Grand River avenue to Farmington, Novi, New Hudson and Brighton and from the latter town south to Island lake and Whitmore lake to Ann Arbor and from that city, where the University of Michigan is located, to Ypsilanti, Wayne and Dearborn. At Ypsilanti the state normal school can be seen, at Wayne the plants of the Harroun Motors Corp., and at Dearborn the country home of Henry Ford.

On this trip, at Island lake, will be seen the camp grounds of the Michigan State Spiritualist Association. On the Grand River road, between Novi and New Hudson, is located the site of the Kensington bank, the first wild cat bank in this section of the country. It was established in 1837.

The beauties of the Oakland county lake region can be seen on a trip from Detroit out Woodward avenue to Pontiac and west through that city on Orchard Lake avenue. Sylvan, Orchard and Cass lakes can be visited. Apple island, in Orchard lake, was the summer home of Chief Pontiac, who ruled supreme in the middle of the eighteenth century in the Michigan territory. Leaving Orchard lake, the tourist can turn south into Farmington, or continue west to Walled lake and from that point south to Novi, striking the Grand River road leading back to Detroit.

Tour Over Concrete Highways

A trip over concrete roads entirely within the borders of Wayne county, in which Detroit is located, can be made. The mileage is about 120. Go east on Jefferson avenue, passing the King, Chalmers, Hudson, Continental motor plants, through beautiful Grosse Pointe to the Seven-Mile road. Follow this concrete stretch westerly across Gratiot, Woodward and Grand River avenues to Northville. Go south from that town through Plymouth to Michigan avenue. Turn east to Wayne and south from that town through Romulus and New Boston, then following the Huron river shore to Flat Rock and Rockwood. Remain on the concrete past the latter town, finally turning left with the concrete, passing Grosse Ile, which is filled with summer homes, and then through Trenton, Wyandotte, Ford, Ecorse and River Rouge to Detroit. At Ecorse, the site of Emmons Park, is the point where Pontiac assembled his braves for the attack on Detroit in 1763.

About midway between Northville and Plymouth on this trip can be seen the remains of Mead's mills, where the first postoffice was established in Michigan in

1831. The foundry, woolen mill and grist mill built by Mead are still standing.

A shorter trip than this, approximately 60 miles in length, can be made out Michigan avenue to Wayne, thence south on the route previously described to Romulus and beyond. On this trip the tourist passes through Dearborn, where Henry Ford's country estate, previously mentioned, is located. Before approaching the town of Dearborn, the motorist passes a little white school house on the left side of the road. It was here the motor car wizard attended school when a boy.

Site of Dearborn Arsenal

Dearborn is also the site of Dearborn arsenal, from which the town takes its name. This arsenal was located on the old Michigan Pike, leading from Detroit to Fort Dearborn, now Chicago. The headquarters building of the arsenal was converted and is now used as the town hall of Dearborn. The powder magazine, turned into a double dwelling house, is still in use nearby.

The trip to Port Huron and intermediate points, which will take the best part of a day, is out Jefferson avenue, as described in the tour to Mount Clemens. About two miles from the city hall, on the right, is located the Michigan Stove Co. plant. In the yard of this firm were buried the dead in the battle of Bloody Run, fought with the Indians in the early days. A tablet marks the point. Bloody Run, a small stream, was destroyed when the city was built up to this point.

Leaving Mount Clemens, the route leads to New Baltimore, Fair Haven, Algonac, Marine City and Saint Clair. From New Baltimore on, most of the shores of Lake Saint Clair and the Saint Clair river are lined with summer cottages and hotels where accommodations may be secured. Harsen's and Dickinson's islands also abound with cottages and clubs. Below these are the famous Saint Clair Flats, filled with cottages and called by some the Venice of America. The Flats are observable only on a boat trip from Detroit to Port Huron, steamers making the trip both ways daily.

At Marine City and Saint Clair are located great salt wells. These are among the largest in the United States.

Another longer trip out of Detroit is to Flint, Mich., which rivals Toledo, Ohio, as the second motor car producing city of the world. It was at Flint that Indians in the early days obtained their flints. These were exchanged with tribes from distant

Capitol Square, on Griswold street, lies the body of Stevens Mason, first governor of Michigan. Aside from the historic things in Detroit and vicinity, there is much attractive scenery, mainly along the rivers and lakes making up a part of the Great Lakes system and the inland lakes of

Oakland and Washtenaw counties and the Huron river.

Visitors in Detroit who desire more detailed information about trips around the city can secure specially prepared route guides at the touring bureau of the Detroit Automobile club in Hotel Pontchartrain.

Answers to Route Inquiries

Detroit, Mich.—Memphis, Tenn.

SENATOBLA, Miss.—Editor *MOTOR AGE*—Give the most direct route from Detroit to Memphis, Tenn.—Ernest McLendon.

From Detroit, Mich., proceed to Wyandotte, Rockwood Sta., Monroe, Toledo, Maumee, Waterville, Neapolis, Liberty Center, Napoleon, Defiance Junction, Antwerp, Woodburn, Ind., New Haven, Fort Wayne, Ind., Bluffton, Montpelier, Hartford City, Muncie, Yorktown, Daleville, Chesterfield, Anderson, Pendleton, Oaklondon, Brightwood, Indianapolis, Franklin, Taylorsville, Columbus, Seymour, Brownstown, Vallonia, Kossuth, Pekin, Borden, St. Joseph, New Albany, Louisville, Mt. Washington, Bardstown, New Haven, Athertonville, Hodgenville, Lincoln Farm, Buffalo, Hardyville, Bear Wallow, Cave City, Mammoth Cave, Cave City, Glasgow, Scottsville, Gallatin, Nashville, Bordeaux, Ashland City, Pardue, Bellburg, Charlotte, Dickson, McEwen, Waverly, Hustburg, Trotters Landing, Camden, Rosser, Huntingdon, Springcreek, Jackson, Huntersville, Harvey, Brownsville, Koko, Stanton, Mason, Gallaway, Arlington, Ellendale, Raleigh, Memphis.

Vols. 4 and 6 of the Automobile Blue Book, published by the Automobile Blue Book Publishing Co., 910 South Michigan avenue, Chicago, contain complete running directions for this trip.

Rapid City, S. D.—Stockton, Kan.

Owanka, S. D.—Editor *MOTOR AGE*—Give best auto route from Rapid City, S. D., to Stockton, Kan.—J. H. Borin.

From Rapid City, drive to Hermosa, Fairburn, Buffalo Gap, Hot Springs, Oelrich, Chadron, Alliance, Bridgeport, Sidney, Chappell, Big Spring, Julesburg, Sterling, Holyoke, Lamar, Imperial, Wauneta, Beverly, Culbertson, McCook, Indianola, Cambridge, south to Norton, Alma, Phillipsburg, south to Stockton.

El Dorado, Kan.—Detroit, Mich.

El Dorado, Kan.—Editor *MOTOR AGE*—Wish to drive from here to Michigan via St. Louis. How much hard surfaced road will I find in Missouri and Illinois and where?—F. L. Preston.

You omitted giving the point in Michigan you wish to reach so we have taken Detroit as our terminus. From El Dorado, drive to Florence, Elmdale, Cottonwood Falls, Emporia, Waverly, Williamsburg, Ottawa, Edgerton, Olathe, Lenexa, Overland Park, Waldo, Mo., Kansas City, Independence, Levasy, Wellington, Lexington, Waverly, Grand Pass, Marshall, Booneville, New Franklin, Rochepot, Columbia, Fulton, Warrenton, Wright City, Wentzville, St. Charles, Junction, St. Louis, Collinsville, Marysville, Edwardsville, Staunton, Mt. Olive, Litchfield, Hillsboro, Nokomis, Pana, Shelbyville, Windsor, Mattoon, Charleston, Grandview, Paris, Terre Haute, Ind., Rockville, Marshall, Waveland, Linden, Elston, Lafayette, Americus, Deer Creek, Logansport, Rochester, Plymouth, South Bend, Elkhart, Middlebury, Howe, Orland, Kinderhook, Mich., Coldwater, Quincy, Allen, Jonesville, Moscow, Somerset, Clinton, Ypsilanti, Wayne, Dearborn, Detroit.

Good roads are in the majority over this route; hard surfaced roads are encountered in the stretch from Kansas City to Columbia, and from Terre Haute to Detroit.

Vols. 7 and 4 of the Automobile Blue Book published by the Automobile Blue Book Pub. Co., 910 S. Michigan Ave., Chicago, contain complete running directions for this trip.

Alexandria, La.—Hot Springs, Ark.

Angola, La.—Editor *MOTOR AGE*—Give routing from Alexandria, La., to Hot Springs, Ark.; also mileage.—G. W. Dreher.

From Alexandria, proceed to Pineville, Bentley, Montgomery, Clarence, Robilene, Belmont, Mansfield, Stonewall, Shreveport, Flournoy, Greenwood, Waskom, Tex., Marshall, Longview, Gladewater, Winona, Tyler, Edom, Canton, Wills Point, Elmo, Terrell, Forney, Mesquite, Dallas, McKinney, Anna, Whitewright, Bonham, Windom, Honey Grove, Brookston, Paris, Sylvan, Blossom, Detroit, Clarksville, Annana, DeKalb, New Boston, Texarkana, Fulton, Hope, Emmet, Prescott, Boughton, Gurdon, Arkadelphia, to Hot Springs.

Vol. 7 of the Automobile Blue Book, published by the Automobile Blue Book Pub. Co., 910 S. Michigan Ave., Chicago, contains complete running directions for this trip.

Indianapolis, Ind.—Greensboro, N. C.

Indianapolis, Ind.—Editor *MOTOR AGE*—Give route directions from here to Greensboro, N. C.—Joseph L. Stout.

From Indianapolis proceed to Rushville, Metamora, Brookville, Cedar Grove, Harrison, Cincinnati, Newport, Alexandria, Peach Grove, Caddo, Berlin, Brookville, Maysville, Aberdeen, Bentonville, West Union, Otway, Henley, Portsmouth, Sciotoville, Ironton, Ashland, Ky., Catlettsburg, Kenova, W. Va., Huntington, Harboursville, Culloden, Hurricane, St. Albans, Spring Hill, Charleston, Marmet, Gauley Bridge, Ansted Sta., Rainelle, Lewisburg, Caldwell, White Sulphur Springs, Clifton Forge, Gala, Fincastle, Troutville, Roanoke, Rockymount, Martinsville, Ridgeway, Madison, Stokesville, Kernersville, Winston-Salem, Walkertown, Kernersville, Colfax, Greensboro.

Vols. 4 and 6 of the Automobile Blue Book, published by the Automobile Blue Book Publishing Co., 910 South Michigan avenue, Chicago, contain complete running directions for this trip.

Indianapolis, Ind.—Mobile, Ala.

Plymouth, Ind.—Editor *MOTOR AGE*—Advise best route from Indianapolis to Mobile, Ala.—George H. Cappel.

From Indianapolis proceed to Franklin, Taylorsville, Columbus, Seymour, Brownstown, Vallonia, Kossuth, Salem, Pekin, Borden, St. Joseph, New Albany, Louisville, Ky., Mt. Washington, Bardstown, New Haven, Athertonville, Hodgenville, Buffalo, Hardyville, Cave City, Mammoth Cave, Cave City, Glasgow, Scottsville, Gallatin, Nashville, Columbia, Mt. Pleasant, Rockdale, Leoma, Florence, Sheffield, Russellville, Hackleburg, Hamilton, Guin, Vernon, Columbus, Miss., Brookville, Macon, De Kalb, Daleville, Meridian, Cuba, Ala., York, Livingston, Coatspa,

Demopolis, Faunsdale, Uniontown, Blalock, Safford, Orrville, Hazen, Beloit, Selma, Beloit, Hazen, Orrville, Cafford, Alberta, Catherine, Lamison, Pine Hill, Sunny South, Thomasville, Fulton, Grove Hill, Jackson, Leroy, McIntosh, Malcolm, Calvert, Chastang, Mobile.

Vols. 4 and 6 of the Automobile Blue Book, published by the Automobile Blue Book Publishing Co., 910 South Michigan avenue, contain complete running directions for this trip.

Michigan City, Ind.—St. Louis, Mo.

Michigan City, Ind.—Give routing from here to St. Louis.—E. G. Sperry.

From Michigan City proceed to La Porte, Westville, Valparaiso, Merrillville, Dyer, Frankport, Ill., New Lenox, Joliet, Elwood, Wilmington, Braceville, Odell, Pontiac, Chenoa, Lexington, Towanda, Bloomington, Lincoln, Elkhart, Williamsville, Springfield, Litchfield, Mt. Olive, Staunton, Edwardsville, Maryville, Collinsville, East St. Louis, St. Louis, Mo.

Vol. 5 of the Automobile Blue Book, published by the Automobile Blue Book Publishing Co., 910 South Michigan avenue, Chicago, contains complete running directions for this trip.

Chicago-West Baden, Ind.

Chicago—Editor *MOTOR AGE*—Advise best route from here to West Baden Springs, Ind.—L. M. Goldberg.

From Chicago proceed to Dyer, Kretzberg, Brunswick, Hanover Center, Lowell, Schneider, Lake Village, Morocco, Ada, Goodland, Remington, Wolcott, Lafayette, Frankfort, Antioch, Lebanon, Royalton, Mackville, Indianapolis, Columbus, Sweet Ireland, Waymanville, Spraytown, Freetown, Bedford, Mitchell, Orleans, Paoli, Prospect Corners to West Baden.

Vol. 4 of the Automobile Blue Book, published by the Automobile Blue Book Publishing Co., 910 South Michigan avenue, Chicago, contains complete running directions for this trip.

Eldora, Ia.—Dehver—Rupert, Ida.

Eldora, Iowa—Editor *MOTOR AGE*—Outline a route from here to Rupert, Ida., traversing Denver and Salt Lake City.—E. T. Lundy.

From Eldora, Iowa, proceed to Marshalltown, Ames, Boone, Ogden, Grand Junction, Jefferson, Glidden, Carroll, Denison, Marion, Dow City, Dunlap, Woodbine, Logan, Missouri Valley, Council Bluffs, Omaha, Elkhorn, Waterloo, Ames, Richland, Columbus, Duncan, Central City, Chapman, Grand Island, Alda, Shelton, Kearney, Elm Creek, Lexington, Cosad, Gothenberg, North Platte, Sutherland, Paxton, Ogallala, Bigspring, Chappell, Sidney, Kimball, Bushnell, Pine Bluff, Cheyenne, Greeley, Denver, LaPorte, Tide Siding, Laramie, Rock River, Carbon, Evansville, Hanna, Fort Steel, Rawlins, Wamsutter, Rock Springs, Green River, Lyman, Fort Bridger, Evanston, Main Forks, Wanship, Salt Lake City, Ogden, Brigham, Wellsville, Franklin, Ida., Whitney, Preston, Clifton, Good Valley, McCammon, Inkorn, Pocatello, west to Rupert.

Vol. 7 of the Automobile Blue Book published by the Automobile Blue Book Pub. Co., 910 S. Michigan Ave., Chicago, contains complete running directions for this trip.

Greenville, Ill.—Henderson, Ky.

Greenville, Ill.—Editor *MOTOR AGE*—Give a route from here to Henderson, Ky.—Guy L. Swiney.

From Greenville, proceed to Springfield, Taylorville, Assumption, Shelbyville, Stewardson, Effingham, Dietrich, Wheeler, Newton, Olney, Vincennes, White River Ferry, Hazleton, Patoka, Princeton, Fort Branch, Haubstadt, Stringtown, Evansville, Howell, Ohio River Ferry, to Henderson.

America's Two Busiest Corners



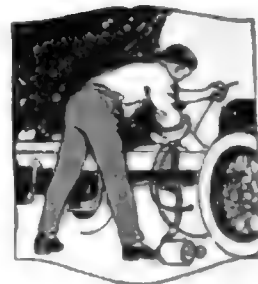
As the left is shown the intersection of Broadway and Madison Avenue, Chicago, undoubtedly the busiest four corners in Chicago and the Middle West. Below is Fifth Avenue and Park Avenue corner, New York, designated as the busiest corner in the world. A survey of these two busy corners shows how little attention pedestrians pay to traffic signals. When vehicles reach for the right of way it is often that the pedestrian ignores the right and takes the life in his hands across a four movement flow.





Electrical Equipment of the Motor Car

By David Penn Moreton & Darwin & Hatch.



Editor's Note—Herewith is presented the forty-fourth installment of a weekly series of articles begun in *MOTOR AGE* issue of June 29 designed to give the motorist the knowledge necessary to enable him to care for and repair any and all of the electrical features of his car, no matter what make or model it may be. At the conclusion of this series, "Electrical Equipment of the Motor Car," with additions, will be published in book form by the *Class Journal Co.*, Chicago, in a size to fit the pocket conveniently.

Part XLIV—Switches and Protective Devices

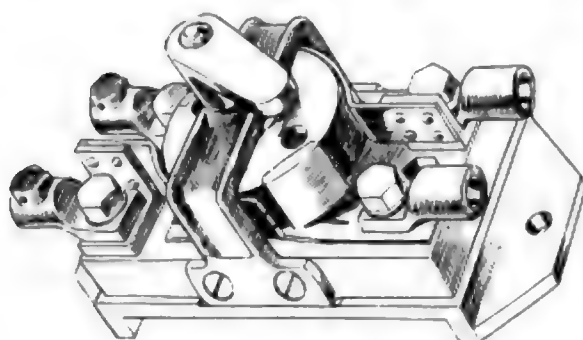


Fig. 252—The rotating, or drum, switch, used by the Leece-Neville Co.

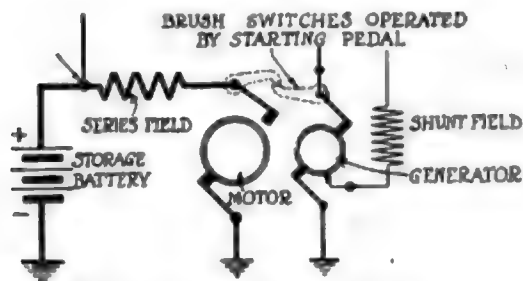


Fig. 250—Diagram of brush switch used in the Delco system

A **ROTATING**, or drum, switch, is one in which the switching operation is accomplished by a rotating member. Two good examples of switches of this kind are shown in Figs. 252 and 253. The switch shown in Fig. 252 is one used by the Leece-Neville Co. in the starting motor circuit shown diagrammatically in Fig. 249. The switch shown in Fig. 253 is made by the Wagner Electric Mfg. Co. An exploded view of this switch is shown in Fig. 254.

The switching operation in the case of a sliding switch is accomplished by moving a set of contacts so they complete a circuit between fixed contacts.

In certain types of switches, which might be called thrust switches, the switching operation is performed by an end or thrust movement of some part of the switch. A good example of a switch of this particular type is shown in Fig. 255, and its operation is quite simple. The switch normally is held open by the coiled spring, but when sufficient pressure is brought to bear on the button or pedal, the contacts may be brought into contact with each other, and will remain in contact until the pressure on the pedal is removed. The action of the spring then will open the switch.

A brush switch is one in which the switching operation is per-

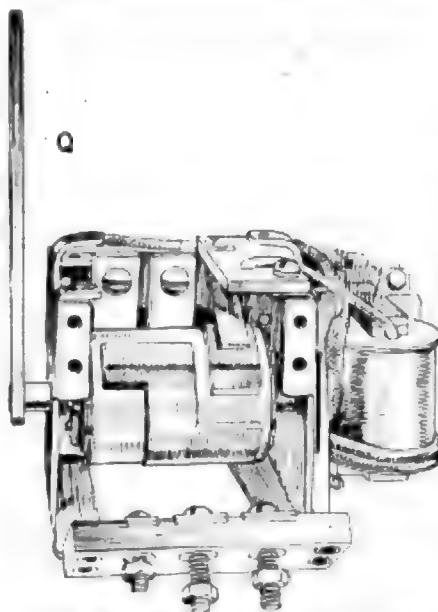


Fig. 253—The rotating, or drum, switch used by the Wagner Electric Co.

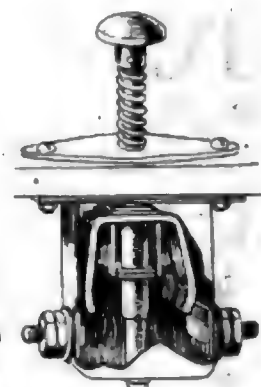


Fig. 255—Example of thrust type of switch in which an end or thrust movement performs the operation

formed by raising and lowering one of the brushes on the machine. A starting switch of this kind, as used on the Delco system, is shown in Fig. 256. Depressing the starting pedal lowers the motor brush and at the same time makes the generator end of the machine inoperative by raising one of the generator brushes.

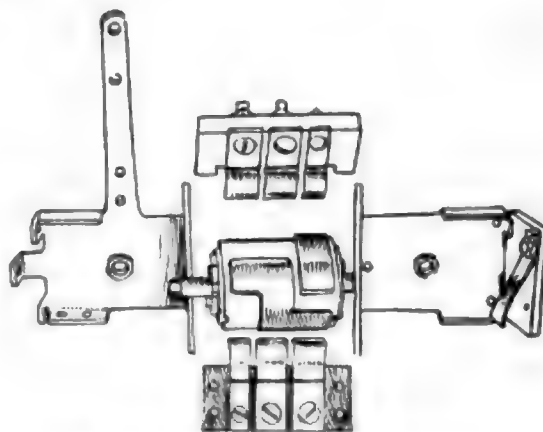


Fig. 254—Exploded view of drum switch used by Wagner Electric Co.



From the Woman's Viewpoint



The Long Handle The Emancipator

ON first thought no one would call the long-handled jack which enables the motorist to work under without getting under an emancipator. But the woman who drives, and in particular the woman who drove when there were no long-handled jacks—if she ever was away from other help at least—might, and does call it so.

Two great bugbears confronted the veteran woman driver, the woman who was thought very eccentric and, well, to be charitable, unusual when she learned to drive one of the two or three cars to come to town back in the early days of rough roads and rougher motoring. One was the starter. The other was the jack.

More than one woman has told the writer that she didn't mind working hard to be able to drive a stiff car, but she did hate to get down on her knees to a quitting tire and persuade the stubborn jack to do its duty. The long-handled jack has made it unnecessary to do this any more, and the starter has long been among us, so that we are finding new and lesser troubles that ruffle the smooth waters of driving.

The new driver is apt to complain that the seat is too high, or too low. Well, that is a trouble and one that should be solved, if the woman driver is to get the most out of motoring. But until each car is a special job it cannot be an individual job, and there are very few pairs when it comes down to the exact measurements of the distance from the cushion to the floor and to the brakes.

The veteran driver advises recapitulation for content. And you do not have to look very far back to the time when there was no long-handled jack, or a starter, either. With this jack another difficulty in the way of women becoming efficient and successful drivers is removed.

Has Your Home a Lunch Basket?

EVEN windy Chicago has been having some real warm weather here lately, and you can imagine how many more cars than usual were out and hiking to the country roads. All the children were along, and as for wraps, they were discarded. It makes you wonder if it isn't almost picnicking time, and if so whether last year's lunch basket is still able to stand the strain of outdoor life and strenuous trips of anywhere from half a day on.

At the used car show several accessory makers exhibited, and here were other signs

of picnicking by motor. There were a motor table restaurant and a refrigerator lunch basket that ran with the running board, and a mere receptacle for two cold-hot bottles and a few asides.

But the table restaurant was the most imposing. It was made so that it could be folded into suitcase size and carried on the running board, or in the car, if wished. When opened there was a table strongly constructed and seemingly able to stand any amount of jarring on the way, or bad table manners afterward. Agate plates, cups, knives, forks and teaspoons, and a few side issues, such as salt and pepper shakers and so on, were a part of the outfit. The entire restaurant was washable.

Then there's the table restaurant that is suspended from the robe rail and fastened to the tonneau floor for security, you know, as well as almost countless others.

University Women Form Reserve Corps

THE university men are going to France as ambulance drivers; the university women are forming reserve corps which include motor car driving. Each man who goes as an ambulance driver furnishes \$350 for his first expenses, passes a physical examination and becomes versed, if he is not already so, in the ways and methods of the light motor car. The women, because they, as yet, have no assured prospect of giving their services in this way, are free from the financial worry of \$350 clear. But they are living as frugal lives in a way as if they had to make this amount, and that soon.

The plan which the ambitious drivers are basing their movement on is modeled on that of Goucher College, Baltimore, Md. Goucher goes so far as to give the number of hours' sleep the women should get, the amount of work and exercise, the time for

going to bed and for rising. It also prescribes the type of service dress and eliminates French heels.

Many university women are signing the pledge of the University Women's Reserve Corps, as it is called:

"I will use my best efforts to make myself physically fit. I will direct my efforts to becoming efficient in —," and here, of course, the women who want to drive in real service—and there are many of them—write motor car driving.

Students in the various schools have signed for other work in addition to motor driving, such as sewing, poultry raising, clerical work, home nursing, dietetics, translation of French, German and Spanish, gardening and teaching.

Some of the university women have obtained leave to leave school to farm, just as so many men have done. There, perhaps, they may have opportunity to drive the tractor and thereby increase the food supply in the present emergency. That women are efficient workers as drivers of tractors has been proved in Europe, and in this country, as for that matter. The woman truck driver, that is, carrier of garden truck, too, is a not too rare sight in America, and with the increased opportunity that women will have to serve the country in this way it is apt to become a very common sight.

There's No Salt with This Advice

EDITOR MOTOR AGE: Here is the way I keep the salt and pepper from mixing through my kitchenette and grub box. I use a 3- or 4-in. piece of ordinary garden hose the correct size to fit snugly over the top of the salt shaker, place a plug of cotton in hose, then put the pepper shaker in the opposite end of the hose, and both are then non-leakable. This may help some other motorist to keep the pepper out of his salads and deserts.—Fred C. Armstrong, Orient, Iowa.

We agree with the writer. If there is anything more annoying to the salt- and pepper-less member of a motoring party than to have to take both, willy-nilly, that member will have to exercise a lot of will power to believe it. This is a good method because so simple—when you think of it—and as the woman of the motoring party is most often the one who sees after the salads and deserts we are passing it on here so that MOTOR AGE readers may have the benefit of the idea.

By the way, why not send in some idea of your own along the same line?



The emancipated woman driver



The Readers' Clearing House

READER SPEAKS FOR LEG ROOM Says Most Cars Are Size for Fourteen- Year-Old Boy

MONTICELLO, Iowa — Editor MOTOR AGE—What is the public asking for in the way of comforts in driving cars and touring? I have given this matter some considerable study, as to the comfort for the driver of a motor car, also for the passengers, and in my opinion, one of these that needs attention as much or more than any one is the cramped-up position of the driver's legs. The space between the front seats and the pedals is so short in the greater number of the different makes of cars, that there is hardly room for the average height of a fourteen-year-old boy to drive a car with comfort, say nothing about a man 5 ft. 10 or 6 ft. in height. The front seat should be set back enough to give the tall man a chance to stretch his legs out far enough to sit in comfort, and there should be a pedal so constructed that it could be easily and quickly adjusted without the use of bolts and made the right length for both the tall and short man.—M. H. Teeter.

WHY A CYLINDER SOUNDS LOUDER Unequal Compression, Poor Valve Adjust- ment and Other Causes

Ellsworth, Minn.—Editor MOTOR AGE—Although compression is good, tappets set correctly, timed correctly, ignition O. K. and everything else in good shape, one cylinder has a louder and different exhaust than the others. I do not mean a miss. What causes this?

2—How can I test a Ford magneto so as to determine its working condition?

3—What causes one or two cylinders to dirty up the spark plugs with soot while the others will stay bright and clean? This soot is dry and not oily, and accumulates in spite of good compression, ignition O. K. and carburetor set lean as possible.

4—What is the bore and stroke of the Crow model C-2? I think it is 1913 or 1913 model.

5—Would it be practical to gear this car down and use it as a tractor something on the plan of the outfits attaching to Ford cars?

6—If so, about what draw-bar horsepower would it deliver at a speed of 3 m.p.h.—A Reader.

1—This might be caused by the cylinders not having the same compression, unequal adjustment of the valves, vibrators on coils having different tensions, or by the spark plugs, one or more of which may have the points set too close or too far

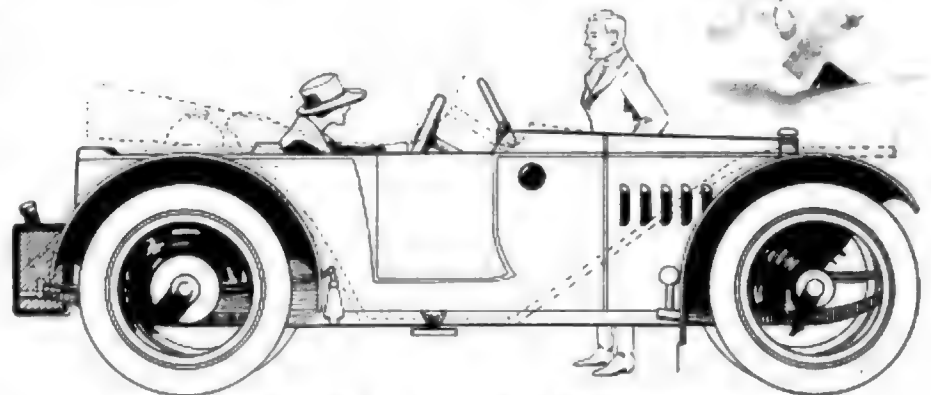


Fig. 1—Diagram showing how 1916 eight-cylinder Scripps-Booth might appear with racer body and Saxon radiator

apart. Too rich or lean a mixture will frequently act the same, and in this case the engine may choke or back fire. Another thing to look for is a worn or partly worn timer ring. Cases like this have been found at times where the different exhaust noises were caused presumably by the shape of the exhaust manifold. When the latter is removed, each cylinder will have the same sound to the exhaust, other things being equal. With the manifold in place it must be remembered that the exhaust from the cylinder nearest the radiator has to pass through the whole length of the manifold, whereas the last cylinder is very close to the manifold opening and may give a somewhat louder report than the former.

2—If you will examine the terminals of the coil box you will find one marked Battery, and to this connect a set of dry cells, grounding the other wire. Run the car on the dry cells at about 12 or 14 m.p.h. and then throw the switch over on the magneto. If the engine misses or does not run as well as it did on the cells, the chances are the magnets are weak.

3—If this soot is soft like that which forms in a lamp chimney, it may be caused by improper combustion due to air leaks in the intake manifold.

4—The bore and stroke is 4 by 4½ in.

5—Yes.

6—There is no means of estimating ac-

curately. However, one should expect a drawbar pull from a 26 hp. engine driving a tractor 3 m.p.h. of something like 3500 lb.

Scripps-Booth Rebuilt

Omaha, Neb.—Editor MOTOR AGE—I would like to rebuild my Scripps-Booth eight-cylinder, 1916 model into a racer using a Saxon six type radiator, and installing exhaust pipes on the outside of the body. Show diagram.

2—What is the speed of this eight-cylinder engine?

3—Could this car attain a speed of 75 m.p.h. if geared up and put in first-class condition, using Lyonite pistons?—Ray Magginius.

1—A diagram made following your ideas is shown in Fig. 1.

2—If you mean the maximum r.p.m. there have been no tests made which establish an official performance.

3—It might and it might not. It is within the possibilities, but it would take very accurate and careful rebuilding and tuning to bring it up to such a speed.

Hudson 33 Rating

Reotone, Ill.—Editor MOTOR AGE—What is the horsepower of the engine on the 33 Hudson, 1912 model, according to the S. A. E. rating?—Henry Koenning.

The rating is 25.6.

American Scout Out Down

Danville, Ill.—Editor MOTOR AGE—Print sketch of an American Underslung scout cut down and made into a speedy type, four passenger roadster, following as far as possible the lines of Mr. Brasor's sketch in MOTOR AGE for April 12, 1917.

2—Do you think the frame is long enough and the engine powerful enough to permit such a design? If not, make the sketch a two-passenger rather than a four-passenger design.

3—Can ordinary Hartford shock absorbers be used on this type of car or should they be of special construction?

4—What is the gear ratio on this car.

5—Would it be advisable to put a higher gear on this car?—Russell M. Duffin.

1—A sketch of how such a car might look is shown in Fig. 2.

2—The car is well adapted to use such a body as sketched.

3—There should be no trouble expe-

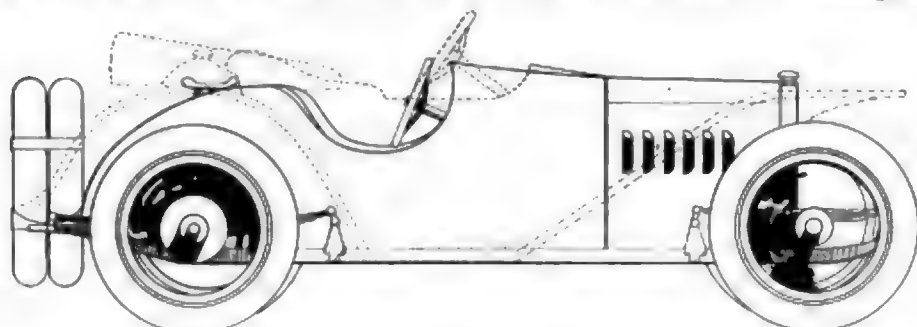


Fig. 2—American scout with new speedster body. The same radiator, hood and wheels are used, with the fenders left off

rienced in fitting these devices without special equipment.

4—The standard gear ratio was 4.07 to 1.

5—No.

WHY OF ERRATIC ENGINE ACTION May Be Intermittent Action of Cooling or Oiling System

Lead. S. D.—Editor *MOTOR AGE*—My 1915 Paige runs nicely when running light and also with a load at times. Sometimes it has power to spare and all at once it will not pull at all, and, although shifted to low gear, it will not pick up until it has been cleaned out. I replaced a model 12 Stewart carburetor with an H. 1 Stromberg, but with little improvement. The engine has a tendency to overheat and usually does not lose power until the water is near the boiling point. What is the trouble?—C. E. Monett.

Granting that all the ordinary adjustments are right, there are several explanations of the malady from which your engine seems to suffer. The fact that it has plenty of power at times and then balks, would seem to indicate an intermittent action of the lubricating or cooling systems. Overheating is the natural result of such an action. Whenever a car owner becomes conscious of a falling off in the power of his engine, he should check up on the oiling system, ignition, cooling, carburetion and valves. Carbon deposits on the pistons, valves and cylinder head will cause an engine to act erratic, but in the case you mention it is suggested that you see if there are any obstructions in the cooling system which would restrict the proper flow of the water. Also the oiling system should be gone over thoroughly. Sometimes pieces of the carbon which forms inside the pistons, traceable to the oil thrown upward, after a time, break off under the influence of the explosion shocks and drop into the crankcase, where they are liable to choke up the oil-ways and oil strainers, thus depreciating the proper lubrication of the engine.

Why No Ten Cylinders

Thurber, Tex.—Editor *MOTOR AGE*—Are ten-cylinder cars practicable and have they ever been tried out?

2—The front cylinder on my Ford 1914 M. misses on account of oil coming up and fouling the plug. I have made oil grooves in the piston and drilled holes in the piston and fitted new rings, but without results, although oil is at proper level, ignition and carburetion O. K. Would drilling a hole from the valve chamber into the crankcase help?—E. Amidel.

1—In conventional engine designs ten-cylinder engines are not practical because they do not permit of a theoretically correct balance.

2—No. You should not drill a hole from

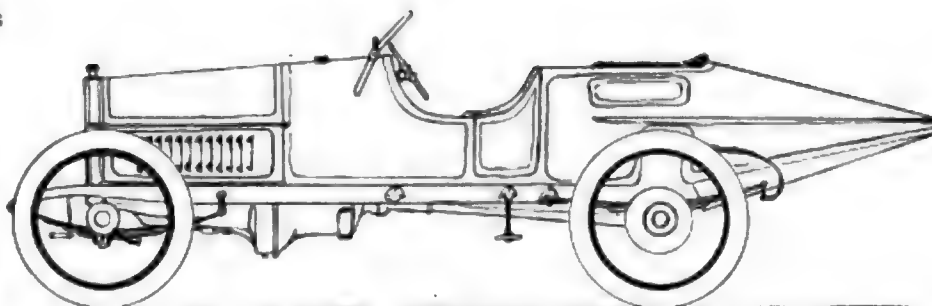


Fig. 3—A 1912 Buick model 29 rebuilt by *MOTOR AGE* reader. It is convertible to afford sleeping quarters

the valve chamber to the crankcase. The holes you have drilled in the piston may in reality assist in pumping the oil into the cylinders rather than prevent it. Try non-leaking rings.

Inquiries Received and Communications Answered

M. H. Teeter.....Monticello, Iowa
A. Reader.....Ellsworth, Minn.
Ray Maggins.....Omaha, Neb.
Henry Koenning.....Reotone, Ill.
F. C. Hodges.....Garland, Tex.
C. E. Monett.....Lead, S. D.
E. Amidel.....Thurber, Tex.
Charles Kendall.....Weatherford, Okla.
W. R. Shepherd.....Charlottesville, Va.
E. Nussbaum.....Peoria, Ill.
A. W. Flaher.....St. Petersburg, Fla.
A. H. Kreider.....Lebanon, Pa.
J. Mohammed Ali.....Birmingham, Mich.
E. R. Ritter.....Cincinnati, Ohio
George Lundberg.....Lansing, Mich.
Williams.....Detroit, Mich.
Floyd L. Stickney.....Lake Placid, N. Y.
Casper Davis.....Wilmet, Ark.
I. L. Yancey.....Campbell, Tex.
S. R. Warren.....Elko, Nev.
Arthur F. Borman.....New Haven, Conn.
George Jones.....Drumright, Okla.
W. F. Walsh.....Sudlow, Ill.
X. Y. Z.....Connersville, Ind.
Karl Kraus.....Mason City, Iowa
G. C. Garrett.....Fort Worth, Tex.
R. B. Rodgers.....Santa Monica, Cal.
E. O. Patterson.....Bushnell, Neb.
Clarence L. Nickerson.....Ellis, Neb.
H. D. Williams.....Salinas, Cal.
J. Y. Montrey.....Tampa, Fla.
J. R. Feiders.....Garden City, L. I.
A. Reader.....Norwalk, Va.

Speedster Also Sleeper

Weatherford, Okla.—Editor *MOTOR AGE*—In Fig. 3 is a diagram of a 1912 Buick model 29, which I have rebuilt. It has a Miller carburetor and Bosch high-tension magneto; also oversize tires. It is a three-passenger. The front seats, which are of bucket type, can be taken out by removing two thumb screws, and a comfortable bed can be made on the floor of the car. The door opens into one side of the left front

seat; there is a small space left between the two front seats so that the passenger wanting to get in the back seat can go between the two front ones; thus necessitating but one door. There is a gas tank in the cowl that holds 8 gal. and an oil tank that holds 2 gal; there is also a space on each side of the third seat which has small openings on the outside of body; these can be used for gloves, etc.—Charles Kendall.

Hupp 20 Speedster

Charlottesville, Va.—Editor *MOTOR AGE*—Illustrate Hupmobile 20 1914 remodeled with speedster body, with sketches showing rear as well as side view if possible.—W. R. Shepherd.

Sketches of the rear and side view of a speedster body adapted to this car are shown in Fig. 4.

Knock Probably Piston Slap

Peoria, Ill.—Editor *MOTOR AGE*—A dull knock is apparent in a 1915 Studebaker four which occurs when the engine is hot. The main bearings are tight, the connecting rod bearings are also all right; the wrist pins seem to be all right, and by shorting the plugs the knock remains the same. The camshaft bearings are all right with the exception of a little end play; the ignition and carburetor adjustment seem O. K. and all carbon has been removed. What is the cause of the knock or how may I be able to locate it?—E. Nussbaum.

If you are sure that all parts are all right as you outline, it would appear that the knock is a piston slap caused by one of the pistons having become a loose fit in the cylinder. This can only be determined by tearing down the engine and wobbling each piston back and forth in the cylinder. If one seems to have considerable play you can be practically sure that this is the cause of the knock.

Where Can He Get Muffler?

St. Petersburg, Fla.—Editor *MOTOR AGE*—I have a two-cycle, two-cylinder engine, bore and stroke $4\frac{1}{4}$ by $4\frac{1}{4}$. This car has had

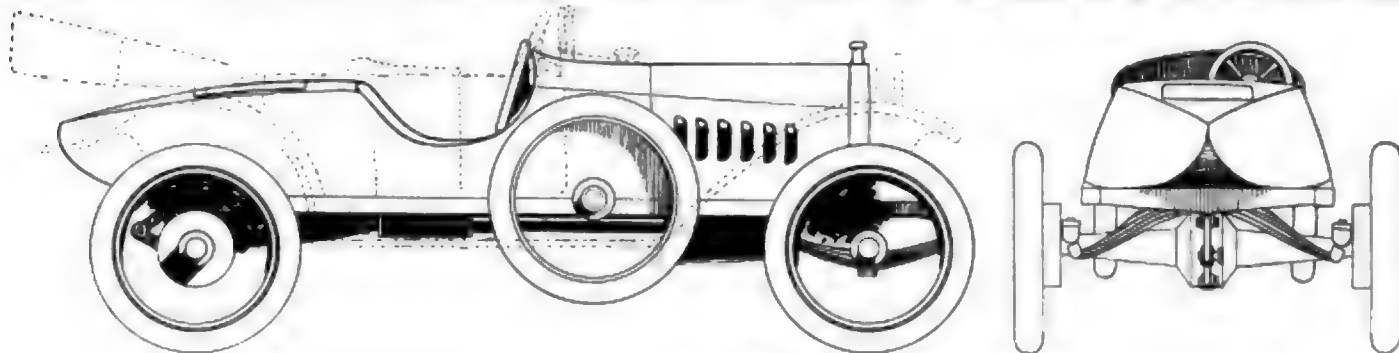


Fig. 4—Side and rear view of Hupmobile model 20 converted into a speedster

1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 2249, 2250, 2251, 2252, 2253, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 2467, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2477, 2478, 2479, 2480, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2489, 2490, 2491, 2492, 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2501, 2502, 2503, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2512, 2513, 2514, 2515, 2516, 2517, 2518, 2519, 2520, 2521, 2522, 2523, 2524, 2525, 2526, 2527, 2528, 2529, 2530, 2531, 2532, 2533, 2534, 2535, 2536, 2537, 2538, 2539, 2540, 2541, 2542, 2543, 2544, 2545, 2546, 2547, 2548, 2549, 2550, 2551, 2552, 2553, 2554, 2555, 2556, 2557, 2558, 2559, 2560, 2561, 2562, 2563, 2564, 2565, 2566, 2567, 2568, 2569, 2570, 2571, 2572, 2573, 2574, 2575, 2576, 2577, 2578, 2579, 2580, 2581, 2582, 2583, 2584, 2585, 2586, 2587, 2588, 2589, 2590, 2591, 2592, 2593, 2594, 2595, 2596, 2597, 2598, 2599, 2600, 2601, 2602, 2603, 2604, 2605, 2606, 2607, 2608, 2609, 2610, 2611, 2612, 2613, 2614, 2615, 2616, 2617, 2618, 2619, 2620, 2621, 2622, 2623, 2624, 2625, 2626, 2627, 2628, 2629, 2630, 2631, 2632, 2633, 2634, 2635, 2636, 2637, 2638, 2639, 2640, 2641, 2642, 2643, 2644, 2645, 2646, 2647, 2648, 2649, 2650, 2651, 2652, 2653, 2654, 2655, 2656, 2657, 2658, 2659, 2660, 2661, 2662, 2663, 2664, 2665, 2666, 2667, 2668, 2669, 2670, 2671, 2672, 2673, 2674, 2675, 2676, 2677, 2678, 2679, 26

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and in this, the presenting is similar to the one for the lateral water to give enough to get to the bottom. The paper may be made thus convenient to store all the data to say for instance to define the conditions made for the upper part of the bottom of the water at 10. This may be made to hold about 1 gal. Sugar is the most common material used.

There are many other reasons why your engine won't power-up and several lines ought to be examined in the following. The first is the battery, which is an engine, partially charged battery has, points to maintenance and they run out of sight, dealing with electrical parts, carbon deposits, limiting overvoltage and remove leads, dragging cables is one thing, too much or too little space between cables used as one cable, too little

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■ **CONCLUSIONS** The results of this study suggest that the use of a single, standardized, and validated questionnaire is a feasible and reliable method for assessing the prevalence of self-reported mental health problems in a community sample. The prevalence of self-reported mental health problems was higher in the community sample than in the clinical sample, which is consistent with the findings of other studies. The results also suggest that the use of a single, standardized, and validated questionnaire is a feasible and reliable method for assessing the prevalence of self-reported mental health problems in a community sample.

There were also some less encouraging results: a cooling system is usually the thing that it will be a lot better. It is a slow process for this time to adjust, but with most cooling systems, the performance is great enough so that the results are good.

University of Georgia, Athens, Georgia 30602-3030



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should not use it to order to avoid the late deposit. If the water appears to be empty, allow it to settle and pour off the last inch or so.

Shelburne, N.-Hitter (Hitter notes: "While every car owner will say Ford must be increased to full-cost prices—meaning that will change the Ford's appearance and make it look different from the million others on the road. Indeed, we own parties sharing their car to time with a Ford. This car would be built for \$10K, and to lose the miserably (less).")

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1.—Please let those who wish complete descriptions of the work refer to the 10th edition by Henry Blake for the Revised and Revised Edition, 1900 and 1901.

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DOI: 10.1037/0893-3200.10.5.000

Further down the road to the left, the road is paved to the left. The road is paved to the left. The road is paved to the left.

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 2737-2738 2739-2740 2741-2742 2743-2744 2745-2746
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DETROIT, Mich.—Police Teams A-2 and B-2 are now working what kind of a case would result, if the evidence happened to get the same value in the marketplace? "Oh, it leaves questions in the Windward 2's 20-page file, General, but probably that and the report was a distinctive way on the 10."

These snakes of course threatened the milk cows, and the smaller ones were called "cow snakes" in many states. The Gila is from our old Southwest. In fact a Gila, or pine, Gopher, was sold and paraded, this morning from sale, with valances, between 10 gophers and 100, upon a cart that, between valances and about 1000 people, the body is opening and the cart has a tail in operation.

In the construction, an entire standard meter was cut up, and made into one piece, and a half-meter or the full standard was. About 100 was used in several dog leashes. The one was built in open form, as a set of approximately 1000. Others.

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As shown in Figure 1, the results of the regression analysis are consistent with the hypotheses. The regression coefficients for the independent variables are all positive and significant at the 1% level. The adjusted R-squared value is 0.85, indicating that the model explains 85% of the variance in the dependent variable. The F-statistic is 12.34, which is significant at the 1% level. The Durbin-Watson statistic is 1.87, which is within the acceptable range of 1.5 to 2.5, indicating that there is no significant autocorrelation in the residuals.

off a spray of bubbles when dipped in salt water and the negative remains inactive.

In your issue of Aug. 3, 1916, on page 25 there is an article which also tells how to distinguish positive from negative terminals. It says to connect a wire to each pole and dip the ends of the wire into a glass of water. The current decomposes the water into hydrogen and oxygen, the hydrogen coming off the negative pole and the oxygen off the positive terminal. As there is twice as much hydrogen as oxygen in water, the terminal giving off the most bubbles is the negative.

These articles seem to be conflicting. Will you state definitely which is correct.—Arthur F. Bormann.

It is the negative wire that gives off the spray of bubbles. We were in error.

THIS NEW ENGINE LABORS—IS STIFF Galloping Engine May Be Due to Several Causes

Drumright, Okla.—Editor Motor Age—What is the trouble with a Dodge engine in a new car when laboring hard in any gear? With spark retarded or advanced, there seems to be a jerk in the engine as though the spark was too far advanced or the explosion too great.

2—What could be the cause of a Dodge engine with Stewart carburetor running fast and then slow when standing idle? Cleaning out the gas system and other adjustments does not have any effect. Cylinders are clean and compression and ignition good.—Geo. Jones.

1—If the spark were too far advanced or the explosion too great, which would mean excessive compression, there would probably be a knock in the engine. If there is no knock, and there is even firing in all cylinders, it would be safe to say that the trouble lies in the fact that the engine is still stiff, and that it will run smoothly after it has been given another 1000 miles or so.

2—This galloping of the engine at low speed can be due to a number of things. The first thing one should look to would be a weak spark. It would also occur with incorrect low-speed adjustment of the carburetor. Leaky valves could also be a cause.

CLINCHER TIRES NOT FOR RACING Will Peel Off of Rims When Car Is Driven Fast

Sudlow, Ill.—Editor Motor Age—What gear ratio was used on the Overland which took third place in the Phoenix race Nov. 20, 1915?

2—Does Motor Age advise the use of castor oil in a stock touring car? What are its advantages and disadvantages compared with mineral oil?

3—Are regular clincher tires satisfactory for $\frac{1}{2}$ mile track racing when the turns are taken at high speed?

4—In repairing a small blowout, is an inner shoe as satisfactory as a vulcanized patch if the outside of the casing is vulcanized to keep out dirt and moisture?

5—What causes inner tubes to burst without injuring the casing?

6—Does Motor Age consider a device which heats the intake manifold better than one which feeds hot air into the carburetor?

7—Will an extra size carburetor give more

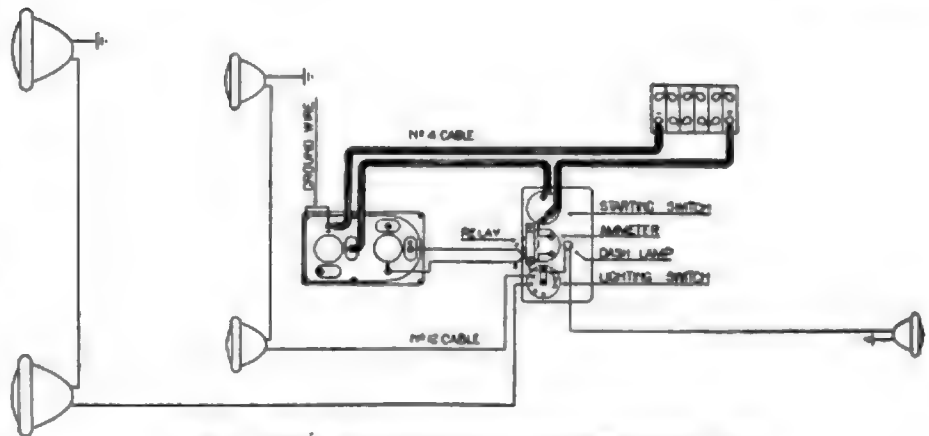
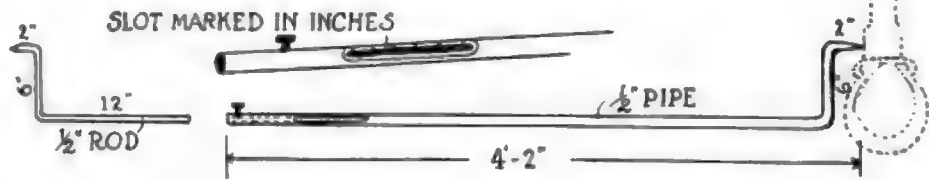


Fig. 9—Wiring of Wagner system on six-cylinder Saxon car



BY KARL KRAUS

Fig. 10—Home-made device for adjusting front wheels of any car

speed using the same size intake manifold?—W. P. Walsh.

1— $3\frac{1}{2}$ to 1 was the gear ratio.

2—Yes, a combination of castor and petroleum oil. There are several such compounds on the market.

3—No, not if you are considering speeds around 75 to 100 m.p.h.

4—No. An inner shoe is a protector to counteract a weakness in the casing. The tube should be vulcanized.

5—Defects in the rubber, deterioration, or particles of sand or dirt which have been left between the casing and the tube.

6—They both serve the same purpose, to heat the gases entering the cylinder. Heating the manifold has a more direct effect.

7—No. The size the carburetor maker specifies is the one which will give the best results.

Carburetor for Old Car

Mason City, Iowa.—Editor Motor Age—In Fig. 10 is a sketch of a simple thing which I have made. It explains itself.

We suggest a piece of Electric conduit instead of gas pipe as it is smooth on the inside and a rod $\frac{1}{2}$ " will fit it very closely.

1—What carburetor does Motor Age think is best for an E. M. F. 30 1912 to make it start easier and save fuel and run good.

2—Has the Kelly-Springfield tire a patent on their non-skid tire?—Karl Kraus.

1—Any standard and modern maker, using the type specified by the manufacturer.

2—The use of the words to form the non-skidding medium are protected.

Wagner Wiring on Saxon

Connersville, Ind.—Editor Motor Age—After a complete overhauling of my Saxon six, I find myself at a loss to know how to wire it properly. It is equipped with the Wagner starting and lighting system. Publish a diagram of the wiring.—X. Y. Z.

The diagram will be found in Fig. 9.

A Correction

Santa Monica, Cal.—Editor Motor Age—Referring to the communication from B. B. Elliott on finding the polarity of wires in the April 12 issue: I beg to differ with this gentleman, for, if two wires are dipped in the solution of salt water it is the negative terminal that gives off the fine spray of bubbles and not the positive wire, as stated in his article.—R. B. Rodgers.

You are correct. It was a misstatement.

Norwalk a Speedster

Fort Worth, Tex.—Editor Motor Age—The rear system wheels and body of my Model D. Special Norwalk car have been burned, so wish to convert it into a roadster or speedster. Give diagram showing how this may be done.—G. C. Garrett.

This is illustrated in Fig. 11.

Piston Rings in Buick

Bushnell, Neb.—Editor Motor Age—Give me the size of the piston rings in a model D-45, 1916 Buick.—E. O. Patterson.

The rings in question are $3\frac{1}{4}$ in. by $\frac{1}{4}$ in.

What Knock Might Be

Seymour, Wis.—Editor Motor Age—My 1914 Jeffery four has a peculiar knock in the engine. The carbon has been scraped, valves ground, main and connecting-rod bearings taken up, tappets adjusted and the oil pump has been examined. The knock is most audible when the motor is idling. At 30 m.p.h. or more the engine runs very smooth. What is the trouble?—J. D. Weblewski.

If the knock has a metallic sound it may be that the timing gears are loose on

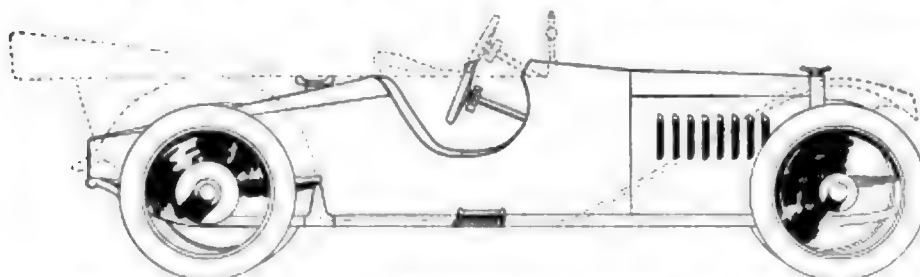


Fig. 11—A racing body on a 1914 Norwalk underslung car. This is for a reader whose car has been damaged by fire

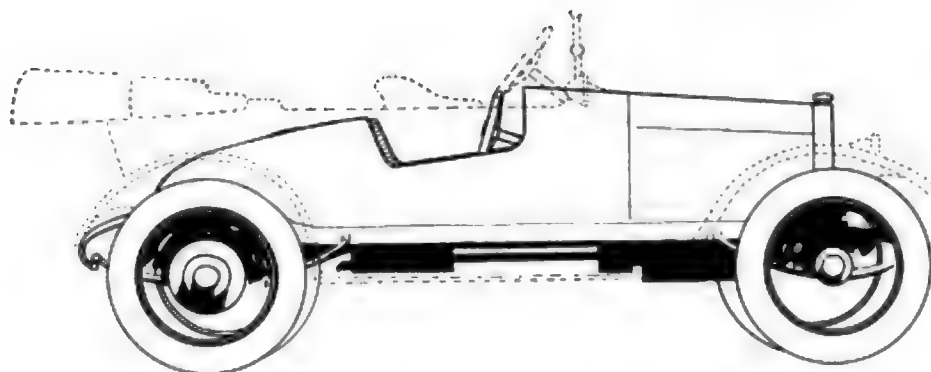


Fig. 12—Simple speedster body for use on a model 81 Overland. This is designed to be built at a minimum expense.

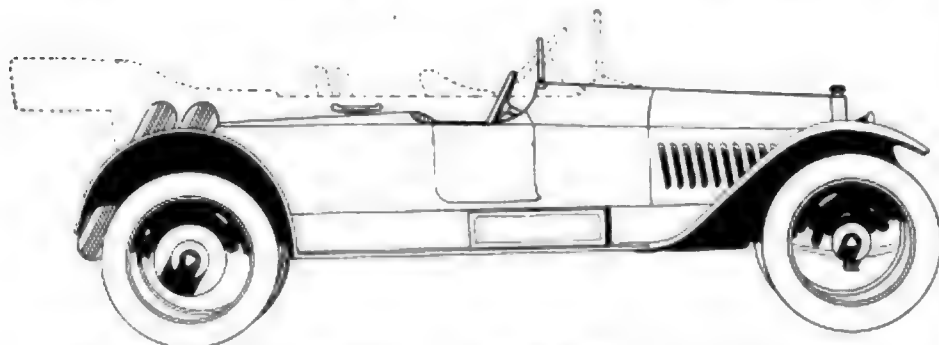


Fig. 13—Straight-line speedster body on a model 54 Hudson. It has a long, sweeping rear deck and low seats. The gasoline tank is carried behind the seat and has a racing-type filler cap in accordance with the correspondent's idea.

their fastenings or that the teeth are worn, or the gears meshed too deeply. The camshaft may be loose or the cams of worn contour. The piston may be binding in the cylinder or worn oval causing side slap in the cylinder. The wrist pin may be loose in the piston. There may be a binding in the crankshaft bearings caused by too tight a fit. The engine base may be loose on the frame. The bolts may be loose on the lower half of the crankcase. The flywheel may be loose on the crankshaft, etc.

Inasmuch as the engine seems to knock only when idling and runs very well at 20 m.p.h. and over, it would be well to look first to the engine supports, to the flywheel for tightness or to the fit of the cylinder head on the crankcase. Low speed might cause a vibration which would create a knock in these places, and then the vibration would be broken up when the engine was accelerated so that the knock would not be apparent at this higher speed.

Wiring of Oakland 35

Norwalk, Va.—Editor *MOTOR AGE*—Publish wiring diagram of Oakland model 35 equipped with Deaco starting and lighting system and a Remy magneto. Show clearly in this diagram how an ammeter should be wired.—J. D.

The diagram is published in Fig. 14.

Speedster on Hudson 54

Tampa, Fla.—Editor *MOTOR AGE*—Having just overhauled my model 54 Hudson car, I am now contemplating the construction of a speedster body for it.

I am willing to go to considerable expense to make this a job of class. I want straight lines throughout with a long, sweeping rear deck and low seats. The gasoline tank would be carried in this rear seat, with a racing-type filler cap. The back of the deck should be so shaped that two tires can be carried

compactly against the car. Publish a sketch.—J. Y. Montrey.

The *MOTOR AGE* artist has endeavored to carry out the lines you suggest in the sketch in Fig. 13.

EFFECT OF WHEEL SIZE ON SPEED Would Not Consider 28-In. Wheels Good for Racing

Salinas, Cal.—Editor *MOTOR AGE*—I wish to convert a Ford into a racer.

1—Can I get wire wheels 28 by 3½ and tires to fit same?

2—Would smaller wheels increase or decrease the speed?

3—What is the safest and least expensive way of lowering the Ford frame?

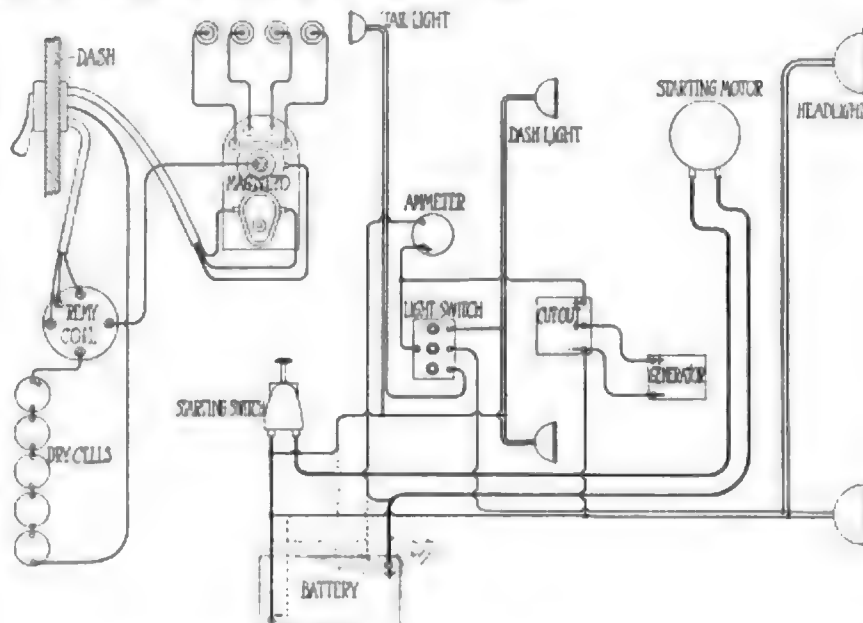


Fig. 14—Wiring of Oakland model 35 equipped with Remy magneto and Deaco starting and lighting system.

4—Give address of a firm making Fiat-type radiators.—H. D. Williams.

1—You can get standard 28-in. wire wheels which will take either 28 by 3 or the oversize tire.

2—It depends entirely on the gearing. That is the relation of engine speed to rear axle speed. With the same gear ratio it is very probable that you could get more speed with 30-in. tires than with 28-in. tires, and we would advise the use of the former for racing.

3—By the method described in the article, Making the Ford Car Fast, on page 34 of the March 1 issue of *MOTOR AGE*.

4—We have no specifications of a true Fiat type radiator for use on a Ford. Thinking that some *MOTOR AGE* reader may know where one can obtain such a radiator, we are inserting a special question on these pages.

Simple Speedster on Overland

Garden City, L. I.—Editor *MOTOR AGE*—I am going to build a speedster body myself for my Overland model 81. I cannot spend much money on the job, and, inasmuch as I am not an experienced sheet metal worker, the design of the body will necessarily have to be simple.

Publish a sketch of a speedster body on this model with a simple turtle back. I would not want running boards or fenders.—J. R. Fedders.

A sketch of how your car might appear is shown in Fig. 12. This is about as simple a speedster body as could be designed, unless you wanted a stripped chassis only with a couple of bucket seats.

Where's This Radiator?

H. D. Williams, Salinas, Cal., is looking for a Fiat-type radiator to fit onto a Ford car which he is rebuilding into a racer. It occurs to us that some of these have been special made in California, although we lack the address of the maker. Can some *MOTOR AGE* reader assist our correspondent in finding such a radiator?

The Motor Car Repair Shop

How to Modernize Old Carbureters

NEW ULM, Minn.—Editor *MOTOR AGE*—One of the most perplexing problems of the garage men and the car owner is the setting of carbureters of the older models which were designed for a better grade of fuel than we are getting now; that is, setting them to meet all conditions. Of course, where the instrument is of too ancient a model, it is best to get a new type, but where the instrument is in good condition, I found that by jacketing the intake manifold with hot exhaust gas, very successful results are obtained. The method of doing this is to take a pipe of some kind and slip over the intake manifold—not necessarily over the whole length as one-half or three quarters will do. It is best at the vertical part. Or where this is impossible to slip on a pipe, take sheet iron and have a pipe made. Where the intake manifold is of cast iron, it can be welded gas-tight at the ends, but where it is of brass or aluminum, it can be made gas-tight by reaming the ends together, then taking babbitt and pouring it into the pipe and letting it run down into the ends, thus filling up the holes—the babbitt being poured into the holes intended for the inlet and outlet of the gas, as shown in Fig. 2. Then a three-quarter pipe is tapped into the exhaust manifold and connected to the inlet of the manifold sleeve and out again at the other end, and may be tapped back into the exhaust pipe or a separate muffler, or else undesirable noises will be had. This will not only give smoother running at all speeds and eliminate back firing into the carburetor, but will also increase the mileage from 10 to 30 per cent. I find that the proper evaporation of the gasoline by heating the manifold this way offsets its drawback by decreasing the volumetric efficiency, so that even more power is derived than before.—Hugo Fesenmaier.

Home-Made Car Lock

Owatonna, Minn.—Editor *MOTOR AGE*—In Fig. 1 is shown a simple device for application on the clutch arm whose main purpose is to minimize the possibility of car theft. This little device can be installed on almost any car with a brace, iron bit and a few minutes' time. For anyone who has this objection to offer—"The installation of this device will tend to weaken the clutch arm and thereby place it in danger of breaking," I can reply thus: It has been a recent development to install three springs, evenly over the clutch surface, where formerly one large spring tended to

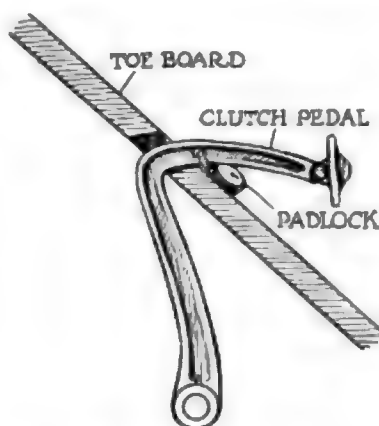


Fig. 1—Another method of locking a car. The padlock holds the clutch engaged.

serve the purpose. You have no weight whatever on this clutch arm other than to connect the engine with the driving member and therefore little resistance other than the springs mentioned will fall upon the clutch arm.

If a good padlock is used there is no danger of anyone running off with your car for when it is used, the clutch cannot be pushed down far enough to disengage.—Mark G. Wynn.

Do You Wipe Your Shoes?

What has become of the old-fashioned motorist who wiped his feet before getting into his car? It seems to the writer that cleanliness in car interiors is getting to be a neglected measure. When cars were less common and consequently more conspicuous, the owner was finicky with the looks

of things. He swabbed off his feet in the grass. Now he seems to use the carpets and rubber mats for foot wipers.

It is bad business. Better to use the edge of the running board as a mud scraper, or why not install a mat on the running board?

Care of the Tools

It may appear to be a small matter to some, but the really mechanically-inclined motorist never would think of using any of the tool equipment of his machine without properly packing and stowing it away again afterward. It often happens that a tool is wanted in a hurry, and if the whole tool equipment has to be taken out and rummaged through to find the particular article wanted, much time and needless energy is expended. Tool kits, compartments for special devices and pockets are provided in most of the car nowadays. Much trouble can be saved in the end by a little attention to this detail, particularly when tools are put away.

Careful motorists wrap their good tools, such as wrenches and drills in oiled cloth before stowing them away in the tool compartments, and this does much to prevent them from becoming rusted and unusable. A case recently noted brought home forcibly the argument against carelessness with tools. On finding a loose nut the only wrench in the car was searched for. On finding it, after much hunting through the miscellaneous collection of tools thrown hastily into the tool box, the screw portion was found to be broken away from the sliding part due to some heavier article such as the jack or a tire iron having struck against it.

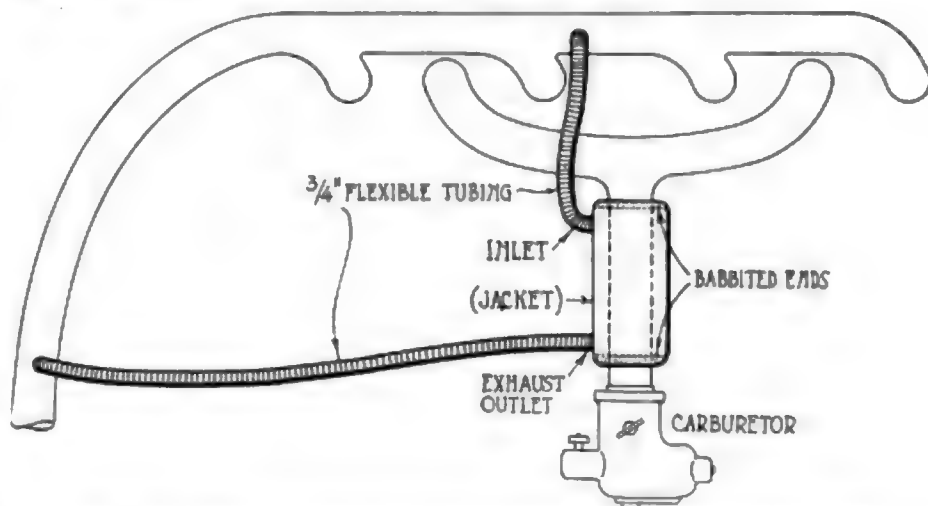


Fig. 2—Installation which may be added to the old carburetion system to take care of the present low grade of gasoline.



Passenger Car or Tractor at W

THE Ford can slide the Collingwood of (British) gas fuel in a downward lead in motion at 1 mph, and some times still not the lead at 10 mph. It can be driven in the field as a passenger car and even at day in the field as a tractor, three times faster as a passenger car.

The new features, including touch and more, were not revealed. It's better to build in the Ford Focus is in one other part of the car than the engine. The side windows, hidden steel with steel doors, are not attached and remain in the car for security. All this, attached in red or black, is not the best. The security that is not placed behind the side of the car, with the exception of the driver, is not in the way of the way when the Ford Focus is not visible.

St. Ignace (the former Academy) has been closed is completely replaced by a new, modern school to equipped with a large gym and two basketball courts plus more. The MacFadden school is equipped with single row bays of 8 ft. and student are placed by the choice of the school. The shopping is done in a building to eliminate single driving one hand confusion. The school has a part of it in an industrial park to attract companies and create of additional jobs.

lives. The setting grows under the gaze from very low. This gaze from under and the gaze from a great collection of 10 to 15. All 10 people, the singer, is looking into space, which is a safe space for me because this.

Shapiro (1) for other reasons, at no earlier point equivalent to the right to that second and final possible life function is working

and other major and minor companies are not in the market for the time being.

Since the opportunity is accepted it is a matter of attempting the most reliable of the front for the phone number, and attaching the master blocks to connect the set into a circuit. There is almost the set back to a passenger vehicle upon the 15, some depending on distance. The driver



THE FUTURE OF THE U.S. FLEET The leader who can be counted on to lead the fleet through the next 20 years, Admiral James L. Holloway III, is shown here with his wife, Mary, and their children, James and Mary.

Heavy Components in Indestructible Pressurized Wheels for Strength

HEAVY and sturdy components, made of steel or cast iron, are used in the Ford truck construction, give a large factor of safety in the indestructible truck as evidenced by the indestructible truck Co., Indianapolis, Ind.

In its trucks the construction follows the usual method of an excellent frame extending from the radiator to a point well back of the rear of the Ford truck. The rear axle of the Ford truck is a joint axle, and this axle is supported by brackets made in the rear axle, giving a 7/8 in. 1/2 inch axle.

One of the extremely unique features is found in the 1/2 in. 7/8 in. pressurized wheels. These are made made of two pieces of cast-iron, the front wheel, front wheel and axle, and the rear wheel, and the 1/2 in. 7/8 in. axle. The front wheel is made of two pieces of cast-iron, the front wheel, front wheel and axle, and the rear wheel, and the 1/2 in. 7/8 in. axle. The front wheel is made of two pieces of cast-iron, the front wheel, front wheel and axle, and the rear wheel, and the 1/2 in. 7/8 in. axle.

The rear axle is 7/8 in. 1/2 inch, as shown in a picture below. These heavy-duty features of this truck are unique.

The entire axle is supported by brackets. The brackets are made of two pieces of cast-iron, the front wheel, front wheel and axle, and the rear wheel, and the 1/2 in. 7/8 in. axle. The front wheel is made of two pieces of cast-iron, the front wheel, front wheel and axle, and the rear wheel, and the 1/2 in. 7/8 in. axle.



Front view of indestructible truck, showing heavy-duty construction of 1/2 in. 7/8 in. axle, which is used in all trucks.

The rear axle is pressed into the rear of the truck. The front wheel is made of two pieces of cast-iron, the front wheel, front wheel and axle, and the rear wheel, and the 1/2 in. 7/8 in. axle.

Spring is made of two pieces of cast-iron, the front wheel, front wheel and axle, and the rear wheel, and the 1/2 in. 7/8 in. axle. The front wheel is made of two pieces of cast-iron, the front wheel, front wheel and axle, and the rear wheel, and the 1/2 in. 7/8 in. axle.

The chassis is made of two pieces of cast-iron, the front wheel, front wheel and axle, and the rear wheel, and the 1/2 in. 7/8 in. axle. The front wheel is made of two pieces of cast-iron, the front wheel, front wheel and axle, and the rear wheel, and the 1/2 in. 7/8 in. axle.

STEAMER COMPANY FORMER

Now they are a new company, but they are still the same as before.



The indestructible truck as seen from the side, showing the 1/2 in. 7/8 in. axle.



The heavy-duty construction of the indestructible truck, showing the 1/2 in. 7/8 in. axle.

A large truck, built on the 1/2 in. 7/8 in. axle, is shown in a picture below. These heavy-duty features of this truck are unique.

The entire axle is supported by brackets. The brackets are made of two pieces of cast-iron, the front wheel, front wheel and axle, and the rear wheel, and the 1/2 in. 7/8 in. axle. The front wheel is made of two pieces of cast-iron, the front wheel, front wheel and axle, and the rear wheel, and the 1/2 in. 7/8 in. axle.

The chassis is made of two pieces of cast-iron, the front wheel, front wheel and axle, and the rear wheel, and the 1/2 in. 7/8 in. axle. The front wheel is made of two pieces of cast-iron, the front wheel, front wheel and axle, and the rear wheel, and the 1/2 in. 7/8 in. axle.

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STEAMER COMPANY FORMER

Now they are a new company, but they are still the same as before.

STEAMER COMPANY FORMER

Now they are a new company, but they are still the same as before.

Among the Makers and Dealers

FOR THE RECORD In 1999, the U.S. Supreme Court ruled that the National Labor Relations Board (NLRB) has the authority to require employers to disclose information about their financial practices to unions. The ruling was a landmark decision for labor unions, as it gave them the right to know how their employers are doing financially. The NLRB has since used this authority to require employers to disclose information about their financial practices to unions in a number of cases.

Shower Windows reveal The Inside
 When the 12-story tower was the site of
 over 10,000 sq ft of space. Under the roof of
 1,200 sq ft, the building had a total capacity
 of 100,000 sq ft. And from that distance, the
 view was great.

These three temporary facilities will be converted to permanent use. The first temporary will be converted to a permanent clinic. The others will be converted into a health center and a health center for the elderly. The third temporary will be converted into a health center for the elderly.

Indiana University's two general assemblies, meeting in Indiana and Ohio, will be held in 1986. But, the bulk of the work will be done. And, the two assemblies of 1986 are not. But, according to the state of Indiana, "the state will have to be in the position of not having any more money than it has now, and it will have to be in the position of not having any more money than it has now."

Continued Building Program—The American Legion claims to have succeeded in forcing upon the state legislature and the voters, through the intervention of numerous legislators, the new statute on community action centers with 1969 as the first year. They intend to make an identical statute, thus insulating the centers from state and local jurisdiction to the end of the century.

Supporting its case "People like the book," says Sims, "most of the reviewers, however, negative." "People like the book," says Sims, "most of the reviewers, however, negative." "People like the book," says Sims, "most of the reviewers, however, negative."

[illegible]

These figures compare with the 1980 figures of 10,000, 10,000, and 10,000 for the three countries. In the United States, the number of people who have been convicted of the crime has increased from 10,000 in 1980 to 15,000 in 1985. In the United Kingdom, the number of people who have been convicted of the crime has increased from 10,000 in 1980 to 15,000 in 1985. In the United States, the number of people who have been convicted of the crime has increased from 10,000 in 1980 to 15,000 in 1985.

According to the 1991 National Health Interview Survey, the last time reported to take more and better the health insurance in 1991, about 10% of the population had the opportunity to purchase the health insurance.



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NOTE. Mr. Smith, besides the controlling interest, also held 1000 shares before change of the ownership of the company, which is stated that as 100,000. Others, besides the above, Smith, connected and associated managers in the firm, the president, J. P. Smith, have not been mentioned in a program, prominent managers in the firm, however in fact, are shown in fact, from a program, prominent

George George, President—The George George Co., San Diego, Calif., is now seeking for sales and engineering talent. Salary and benefits for position in 1988 range from \$20,000 to \$40,000.

[illegible]

Shoreline Time Investments Capital—Shoreline Time is looking for one investment of around \$100 to \$150 million in the U.S. and Canada. The company has been in business for 10 years, and has a track record of about 100% return on investment. The company has been a leader in the industry, and has a strong reputation for its products and services. The company is looking for a partner who can help it expand its operations and increase its market share.

"The Institute's Survey Shows: The Top Issue That We Are Concerned About Is 12 percent of the total of 10 concerns. The second issue was Technology and Education, a reduction of 14 percent, a third in training and research, 10 percent, and the fourth issue was health care, 9 percent. The survey shows that the top issue for the American farmer and the 92 per cent of the total is 12 percent."

Report: 20,000 Deaths—That's what the World Health Organization (WHO) has estimated for the total toll of the 1968 Hong Kong flu pandemic. The WHO's estimate is based on data from Hong Kong, where the epidemic peaked in the summer of 1968. The WHO's estimate is based on data from Hong Kong, where the epidemic peaked in the summer of 1968.

*These are compared with recent practice in the United States based on studies that are available.

Principal Investigator: Dr. J. H. Garman, Department of Biology, University of California, San Diego, La Jolla, CA 92037. **Co-Investigator:** Dr. J. H. Garman, Department of Biology, University of California, San Diego, La Jolla, CA 92037. **Project Title:** The Biology of the California Condor.

[illegible]

Grand Plains National Agency—Bureau. Box 210, 1001 First Ave., Lakewood, Colorado 80401. The Director is Walter J. Smith. A list of the National Park and National Monument units located in the Grand Plains region may be obtained by contacting the Bureau Office.

Working in Eastern Germany—The First Since the 1990 ending German policies to restrict emigration to the former GDR, German citizens are free to migrate and work in eastern Germany. Working migrants in Berlin in the last 10 years, for the first time, have come from the east, as evidenced by migration data in the

During the 1990s, the United States and other countries have been working to improve the quality of their health care systems. This has led to a number of changes in the way health care is delivered, including the use of electronic health records (EHRs) and the implementation of patient safety programs. These changes have helped to reduce medical errors and improve the overall quality of care. However, there are still many challenges that need to be addressed in order to further improve the health care system. One of the main challenges is the lack of interoperability between different health care systems. This makes it difficult for providers to share patient information and coordinate care. Another challenge is the shortage of health care professionals, particularly in rural areas. Finally, there is a need to improve the efficiency of the health care system, as costs continue to rise. Addressing these challenges will be essential for ensuring that the health care system is able to meet the needs of the population in the future.

There is nothing Germany-like (or even American) in the way Americans on the subject of the war in Korea feel about the village where the UN is based in the country and administration concerned in practice and theory. The country has fought a hard war since the first war. The UN has spent its money

MOTOR AGE

Vol. 12, No. 10

CHICAGO, MAY 31, 1917

Subscription Price \$2.00 per Annum in Advance



**Champion
Toledo**

Dependable Spark Plugs

Another Case Where Popular
Demand Necessitates Carload Ship-
ments of Champion Spark Plugs



Champion Spark Plug Co.,
Detroit,
Mich.
Dear Sirs:



Dear Sirs:
April 25, 1917.

We are glad to receive your letter of the 15th stating that our April carload of Champion spark plugs has left the factory.

We need them badly. The demand for Champion spark plugs this season is far in excess of any previous season during which we have supplied them. Our sales of Champion spark plugs have increased more than 100% this year since 1915, and there is every indication that 1917 will show an even better record than 1916.

We have of no better witnesses of the popularity of the plug than this record of sales. Our only fear is that the supply is not going to be equal to the demand.

Yours very truly,

EDWARD HERRING, President

Edward Herring
Manager, Inventory Sales.

ONE BOX

Confidence

Stedtfaber merchants are enthusiastic for the future, so are we, for Stedtfaber value is a bigger sales point index than ever before.

[illegible]

1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 2249, 2250, 2251, 2252, 2253, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 2467, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2477, 2478, 2479, 2480, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2489, 2490, 2491, 2492, 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2501, 2502, 2503, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2512, 2513, 2514, 2515, 2516, 2517, 2518, 2519, 2520, 2521, 2522, 2523, 2524, 2525, 2526, 2527, 2528, 2529, 2530, 2531, 2532, 2533, 2534, 2535, 2536, 2537, 2538, 2539, 2540, 2541, 2542, 2543, 2544, 2545, 2546, 2547, 2548, 2549, 2550, 2551, 2552, 2553, 2554, 2555, 2556, 2557, 2558, 2559, 2560, 2561, 2562, 2563, 2564, 2565, 2566, 2567, 2568, 2569, 2570, 2571, 2572, 2573, 2574, 2575, 2576, 2577, 2578, 2579, 2580, 2581, 2582, 2583, 2584, 2585, 2586, 2587, 2588, 2589, 2590, 2591, 2592, 2593, 2594, 2595, 2596, 2597, 2598, 2599, 2600, 2601, 2602, 2603, 2604, 2605, 2606, 2607, 2608, 2609, 2610, 2611, 2612, 2613, 2614, 2615, 2616, 2617, 2618, 2619, 2620, 2621, 2622, 2623, 2624, 2625, 2626, 2627, 2628, 2629, 2630, 2631, 2632, 2633, 2634, 2635, 2636, 2637, 2638, 2639, 2640, 2641, 2642, 2643, 2644, 2645, 2646, 2647, 2648, 2649, 2650, 2651, 2652, 2653, 2654, 2655, 2656, 2657, 2658, 2659, 2660, 2661, 2662, 2663, 2664, 2665, 2666, 2667, 2668, 2669, 2670, 2671, 2672, 2673, 2674, 2675, 2676, 2677, 2678, 2679, 26

100

The House has now decided that even so, Kennedy was not a communist. The answer to the vote of 369-17 was 369-17.

100

100

—Your time payments can be lower sometimes. But we think it's better that they pay every 15 days, because you know you have to pay every 15 days. You know you have to pay every 15 days.

Abstract

John (Jack) John, April 18, 1937.
His very handsome son, Jack, was born in 1937.
He married and lived with her, John, until
the morning of his death, 1967. He is
now in the care of his son and his wife, who
are his only children. He was in the service of the
U.S. Navy.

Abstract

100

San Francisco, Calif., May 20, 1997.
Our agents are for this season's business plan
idea, still, you're the biggest reason we have
you here. Because in particular, we're right in
the greatest place.

1000

100

Monday, March 29, 1987
 Monday, March 29, 1987 was the biggest day for me
 since I joined this company. Not only did I
 get paid and my computer, but I also got
 the money that I had been waiting for for
 months. It was a great day for me and
 my family. I was so happy and I was
 able to pay my bills. I was so
 happy and I was able to pay my bills.

[illegible]

STUDEBAKER

DETROIT, MICH. SOUTH BEND, IND. WILKESVILLE, OH.

Abstract

It pays to be a *Studebaker* dealer

1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 2249, 2250, 2251, 2252, 2253, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 2467, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2477, 2478, 2479, 2480, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2489, 2490, 2491, 2492, 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2501, 2502, 2503, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2512, 2513, 2514, 2515, 2516, 2517, 2518, 2519, 2520, 2521, 2522, 2523, 2524, 2525, 2526, 2527, 2528, 2529, 2530, 2531, 2532, 2533, 2534, 2535, 2536, 2537, 2538, 2539, 2540, 2541, 2542, 2543, 2544, 2545, 2546, 2547, 2548, 2549, 2550, 2551, 2552, 2553, 2554, 2555, 2556, 2557, 2558, 2559, 2560, 2561, 2562, 2563, 2564, 2565, 2566, 2567, 2568, 2569, 2570, 2571, 2572, 2573, 2574, 2575, 2576, 2577, 2578, 2579, 2580, 2581, 2582, 2583, 2584, 2585, 2586, 2587, 2588, 2589, 2590, 2591, 2592, 2593, 2594, 2595, 2596, 2597, 2598, 2599, 2600, 2601, 2602, 2603, 2604, 2605, 2606, 2607, 2608, 2609, 2610, 2611, 2612, 2613, 2614, 2615, 2616, 2617, 2618, 2619, 2620, 2621, 2622, 2623, 2624, 2625, 2626, 2627, 2628, 2629, 2630, 2631, 2632, 2633, 2634, 2635, 2636, 2637, 2638, 2639, 2640, 2641, 2642, 2643, 2644, 2645, 2646, 2647, 2648, 2649, 2650, 2651, 2652, 2653, 2654, 2655, 2656, 2657, 2658, 2659, 2660, 2661, 2662, 2663, 2664, 2665, 2666, 2667, 2668, 2669, 2670, 2671, 2672, 2673, 2674, 2675, 2676, 2677, 2678, 2679, 2680, 26

year of living, eating, drinking, talking, may, in return, have contributed to the motor car "idea."

After three or four consecutive thirty-three months' continuous service in the motor car at first, based on the same conditions of the engine that into the personnel he engaged in different work, a headmaster, three assistant headmasters, one assistant principal, one chief mechanic and two auto drivers, thirty-three months' auto work did not, and two months' school bus, but he concludes the most important factor in his motorized trade operations. With guards and passengers, officers and without traveling funds and funds over the line of commercial vehicles, it took no more management, discipline, and organization to return him now to an emergency, without loss, while, in addition, as a little bird sang out to all sorts of workers.

From School to Street

Three years later, then exposed to the line of commercialism, things were that the teacher was possessed, and others were not, broken up, established, or still otherwise, types included: Franklyn White, Kelly-Holmgren, Peter-Wood, John, Joe, Ray, Spaul, and representatives of Thomas, Adams, Perkins, Shaw, Christie, Whelan, Fitzgerald, Howard, and 1927 schoolmaster. Most things have been in existence for fifty years under cover, and 1927 is still things known to commercial that goes the way brought into Mexico for the first time in United States. To take this out of a hole were used for "show," and for the first time for the first time, and for the first time, having considerable, large trucks. These equipped with following a new look in the field with possible to say that that has made, but in fact things were very dangerous.

The trade, which penetrated between north, south, before, throughout, reached a point in the automobile for the majority of the first years, over the hands of the Mexican City, Mexico and Mexico entered Mexico from California into the state of Mexico, and from the way toward, for example, but later back toward, the perhaps little more continuous and less with the two states, various groups of, mostly collected, played in the streets, sometimes with a few cars, made, away from police, law, or otherwise had that might give a clue to the whereabouts of this. The trade was going to bring more money. It was that this money, and the idea, are few children whose good nature is changed and done. Nothing, however, and then, and money, like, was all that that have into it, while from several years before, that that all they could get for the money, or give or buy, and more little more. But there taking the auto education, having it in order according to reference the culture, and the culture of exchange, would have the big the top of the table.

When asked for the idea in the commercial brought the stage, "that must be the in-



Ray & Adams, the father-son team, as frequent and frequent victims in sports today. The father can be responsible for the creature.

the wife would be done, and, before for the top of a house, designed to a commercial situation. Right not after it, but in reality, that the upper range was, with the party of one or eight children, gone to their beds. The trade consisted his own, and provided every action could until the break was broken. Because every 15-20-30-40-50-60-70-80-90-100-110-120-130-140-150-160-170-180-190-200-210-220-230-240-250-260-270-280-290-300-310-320-330-340-350-360-370-380-390-400-410-420-430-440-450-460-470-480-490-500-510-520-530-540-550-560-570-580-590-600-610-620-630-640-650-660-670-680-690-700-710-720-730-740-750-760-770-780-790-800-810-820-830-840-850-860-870-880-890-900-910-920-930-940-950-960-970-980-990-1000-1010-1020-1030-1040-1050-1060-1070-1080-1090-1100-1110-1120-1130-1140-1150-1160-1170-1180-1190-1200-1210-1220-1230-1240-1250-1260-1270-1280-1290-1300-1310-1320-1330-1340-1350-1360-1370-1380-1390-1400-1410-1420-1430-1440-1450-1460-1470-1480-1490-1500-1510-1520-1530-1540-1550-1560-1570-1580-1590-1600-1610-1620-1630-1640-1650-1660-1670-1680-1690-1700-1710-1720-1730-1740-1750-1760-1770-1780-1790-1800-1810-1820-1830-1840-1850-1860-1870-1880-1890-1900-1910-1920-1930-1940-1950-1960-1970-1980-1990-2000-2010-2020-2030-2040-2050-2060-2070-2080-2090-2100-2110-2120-2130-2140-2150-2160-2170-2180-2190-2200-2210-2220-2230-2240-2250-2260-2270-2280-2290-2300-2310-2320-2330-2340-2350-2360-2370-2380-2390-2400-2410-2420-2430-2440-2450-2460-2470-2480-2490-2500-2510-2520-2530-2540-2550-2560-2570-2580-2590-2600-2610-2620-2630-2640-2650-2660-2670-2680-2690-2700-2710-2720-2730-2740-2750-2760-2770-2780-2790-2800-2810-2820-2830-2840-2850-2860-2870-2880-2890-2900-2910-2920-2930-2940-2950-2960-2970-2980-2990-3000-3010-3020-3030-3040-3050-3060-3070-3080-3090-3100-3110-3120-3130-3140-3150-3160-3170-3180-3190-3200-3210-3220-3230-3240-3250-3260-3270-3280-3290-3300-3310-3320-3330-3340-3350-3360-3370-3380-3390-3400-3410-3420-3430-3440-3450-3460-3470-3480-3490-3500-3510-3520-3530-3540-3550-3560-3570-3580-3590-3600-3610-3620-3630-3640-3650-3660-3670-3680-3690-3700-3710-3720-3730-3740-3750-3760-3770-3780-3790-3800-3810-3820-3830-3840-3850-3860-3870-3880-3890-3900-3910-3920-3930-3940-3950-3960-3970-3980-3990-4000-4010-4020-4030-4040-4050-4060-4070-4080-4090-4100-4110-4120-4130-4140-4150-4160-4170-4180-4190-4200-4210-4220-4230-4240-4250-4260-4270-4280-4290-4300-4310-4320-4330-4340-4350-4360-4370-4380-4390-4400-4410-4420-4430-4440-4450-4460-4470-4480-4490-4500-4510-4520-4530-4540-4550-4560-4570-4580-4590-4600-4610-4620-4630-4640-4650-4660-4670-4680-4690-4700-4710-4720-4730-4740-4750-4760-4770-4780-4790-4800-4810-4820-4830-4840-4850-4860-4870-4880-4890-4900-4910-4920-4930-4940-4950-4960-4970-4980-4990-5000-5010-5020-5030-5040-5050-5060-5070-5080-5090-5100-5110-5120-5130-5140-5150-5160-5170-5180-5190-5200-5210-5220-5230-5240-5250-5260-5270-5280-5290-5300-5310-5320-5330-5340-5350-5360-5370-5380-5390-5400-5410-5420-5430-5440-5450-5460-5470-5480-5490-5500-5510-5520-5530-5540-5550-5560-5570-5580-5590-5600-5610-5620-5630-5640-5650-5660-5670-5680-5690-5700-5710-5720-5730-5740-5750-5760-5770-5780-5790-5800-5810-5820-5830-5840-5850-5860-5870-5880-5890-5900-5910-5920-5930-5940-5950-5960-5970-5980-5990-6000-6010-6020-6030-6040-6050-6060-6070-6080-6090-6100-6110-6120-6130-6140-6150-6160-6170-6180-6190-6200-6210-6220-6230-6240-6250-6260-6270-6280-6290-6300-6310-6320-6330-6340-6350-6360-6370-6380-6390-6400-6410-6420-6430-6440-6450-6460-6470-6480-6490-6500-6510-6520-6530-6540-6550-6560-6570-6580-6590-6600-6610-6620-6630-6640-6650-6660-6670-6680-6690-6700-6710-6720-6730-6740-6750-6760-6770-6780-6790-6800-6810-6820-6830-6840-6850-6860-6870-6880-6890-6900-6910-6920-6930-6940-6950-6960-6970-6980-6990-7000-7010-7020-7030-7040-7050-7060-7070-7080-7090-7100-7110-7120-7130-7140-7150-7160-7170-7180-7190-7200-7210-7220-7230-7240-7250-7260-7270-7280-7290-7300-7310-7320-7330-7340-7350-7360-7370-7380-7390-7400-7410-7420-7430-7440-7450-7460-7470-7480-7490-7500-7510-7520-7530-7540-7550-7560-7570-7580-7590-7600-7610-7620-7630-7640-7650-7660-7670-7680-7690-7700-7710-7720-7730-7740-7750-7760-7770-7780-7790-7800-7810-7820-7830-7840-7850-7860-7870-7880-7890-7900-7910-7920-7930-7940-7950-7960-7970-7980-7990-8000-8010-8020-8030-8040-8050-8060-8070-8080-8090-8100-8110-8120-8130-8140-8150-8160-8170-8180-8190-8200-8210-8220-8230-8240-8250-8260-8270-8280-8290-8300-8310-8320-8330-8340-8350-8360-8370-8380-8390-8400-8410-8420-8430-8440-8450-8460-8470-8480-8490-8500-8510-8520-8530-8540-8550-8560-8570-8580-8590-8600-8610-8620-8630-8640-8650-8660-8670-8680-8690-8700-8710-8720-8730-8740-8750-8760-8770-8780-8790-8800-8810-8820-8830-8840-8850-8860-8870-8880-8890-8900-8910-8920-8930-8940-8950-8960-8970-8980-8990-9000-9010-9020-9030-9040-9050-9060-9070-9080-9090-9100-9110-9120-9130-9140-9150-9160-9170-9180-9190-9200-9210-9220-9230-9240-9250-9260-9270-9280-9290-9300-9310-9320-9330-9340-9350-9360-9370-9380-9390-9400-9410-9420-9430-9440-9450-9460-9470-9480-9490-9500-9510-9520-9530-9540-9550-9560-9570-9580-9590-9600-9610-9620-9630-9640-9650-9660-9670-9680-9690-9700-9710-9720-9730-9740-9750-9760-9770-9780-9790-9800-9810-9820-9830-9840-9850-9860-9870-9880-9890-9900-9910-9920-9930-9940-9950-9960-9970-9980-9990-10000-10010-10020-10030-10040-10050-10060-10070-10080-10090-10100-10110-10120-10130-10140-10150-10160-10170-10180-10190-10200-10210-10220-10230-10240-10250-10260-10270-10280-10290-10300-10310-10320-10330-10340-10350-10360-10370-10380-10390-10400-10410-10420-10430-10440-10450-10460-10470-10480-10490-10500-10510-10520-10530-10540-10550-10560-10570-10580-10590-10600-10610-10620-10630-10640-10650-10660-10670-10680-10690-10700-10710-10720-10730-10740-10750-10760-10770-10780-10790-10800-10810-10820-10830-10840-10850-10860-10870-10880-10890-10900-10910-10920-10930-10940-10950-10960-10970-10980-10990-11000-11010-11020-11030-11040-11050-11060-11070-11080-11090-11100-11110-11120-11130-11140-11150-11160-11170-11180-11190-11200-11210-11220-11230-11240-11250-11260-11270-11280-11290-11300-11310-11320-11330-11340-11350-11360-11370-11380-11390-11400-11410-11420-11430-11440-11450-11460-11470-11480-11490-11500-11510-11520-11530-11540-11550-11560-11570-11580-11590-11600-11610-11620-11630-11640-11650-11660-11670-11680-11690-11700-11710-11720-11730-11740-11750-11760-11770-11780-11790-11800-11810-11820-11830-11840-11850-11860-11870-11880-11890-11900-11910-11920-11930-11940-11950-11960-11970-11980-11990-12000-12010-12020-12030-12040-12050-12060-12070-12080-12090-12100-12110-12120-12130-12140-12150-12160-12170-12180-12190-12200-12210-12220-12230-12240-12250-12260-12270-12280-12290-12300-12310-12320-12330-12340-12350-12360-12370-12380-12390-12400-12410-12420-12430-12440-12450-12460-12470-12480-12490-12500-12510-12520-12530-12540-12550-12560-12570-12580-12590-12600-12610-12620-12630-12640-12650-12660-12670-12680-12690-12700-12710-12720-12730-12740-12750-12760-12770-12780-12790-12800-12810-12820-12830-12840-12850-12860-12870-12880-12890-12900-12910-12920-12930-12940-12950-12960-12970-12980-12990-13000-13010-13020-13030-13040-13050-13060-13070-13080-13090-13100-13110-13120-13130-13140-13150-13160-13170-13180-13190-13200-13210-13220-13230-13240-13250-13260-13270-13280-13290-13300-13310-13320-13330-13340-13350-13360-13370-13380-13390-13400-13410-13420-13430-13440-13450-13460-13470-13480-13490-13500-13510-13520-13530-13540-13550-13560-13570-13580-13590-13600-13610-13620-13630-13640-13650-13660-13670-13680-13690-13700-13710-13720-13730-13740-13750-13760-13770-13780-13790-13800-13810-13820-13830-13840-13850-13860-13870-13880-13890-13900-13910-13920-13930-13940-13950-13960-13970-13980-13990-14000-14010-14020-14030-14040-14050-14060-14070-14080-14090-14100-14110-14120-14130-14140-14150-14160-14170-14180-14190-14200-14210-14220-14230-14240-14250-14260-14270-14280-14290-14300-14310-14320-14330-14340-14350-14360-14370-14380-14390-14400-14410-14420-14430-14440-14450-14460-14470-14480-14490-14500-14510-14520-14530-14540-14550-14560-14570-14580-14590-14600-14610-14620-14630-14640-14650-14660-14670-14680-14690-14700-14710-14720-14730-14740-14750-14760-14770-14780-14790-14800-14810-14820-14830-14840-14850-14860-14870-14880-14890-14900-14910-14920-14930-14940-14950-14960-14970-14980-14990-15000-15010-15020-15030-15040-15050-15060-15070-15080-15090-15100-15110-15120-15130-15140-15150-15160-15170-15180-15190-15200-15210-15220-15230-15240-15250-15260-15270-15280-15290-15300-15310-15320-15330-15340-15350-15360-15370-15380-15390-15400-15410-15420-15430-15440-15450-15460-15470-15480-15490-15500-15510-15520-15530-15540-15550-15560-15570-15580-15590-15600-15610-15620-15630-15640-15650-15660-15670-15680-15690-15700-15710-15720-15730-15740-15750-15760-15770-15780-15790-15800-15810-15820-15830-15840-15850-15860-15870-15880-15890-15900-15910-15920-15930-15940-15950-15960-15970-15980-15990-16000-16010-16020-16030-16040-16050-16060-16070-16080-16090-16100-16110-16120-16130-16140-16150-16160-16170-16180-16190-16200-16210-16220-16230-16240-16250-16260-16270-16280-16290-16300-16310-16320-16330-16340-16350-16360-16370-16380-16390-16400-16410-16420-16430-16440-16450-16460-16470-16480-16490-16500-16510-16520-16530-16540-16550-16560-16570-16580-16590-16600-16610-16620-16630-16640-16650-16660-16670-16680-16690-16700-16710-16720-16730-16740-16750-16760-16770-16780-16790-16800-16810-16820-16830-16840-16850-16860-16870-16880-16890-16900-16910-16920-16930-16940-16950-16960-16970-16980-16990-17000-17010-17020-17030-17040-17050-17060-17070-17080-17090-17100-17110-17120-17130-17140-17150-17160-17170-17180-17190-17200-17210-17220-17230-17240-17250-17260-17270-17280-17290-17300-17310-17320-17330-17340-17350-17360-17370-17380-17390-17400-17410-17420-17430-17440-17450-17460-17470-17480-17490-17500-17510-17520-17530-17540-17550-17560-17570-17580-17590-17600-17610-17620-17630-17640-17650-17660-17670-17680-17690-17700-17710-17720-17730-17740-17750-17760-17770-17780-17790-17800-17810-17820-17830-17840-17850-17860-17870-17880-17890-17900-17910-17920-17930-17940-17950-17960-17970-17980-17990-18000-18010-18020-18030-18040-18050-18060-18070-18080-18090-18100-18110-18120-18130-18140-18150-18160-18170-18180-18190-18200-18210-18220-18230-18240-18250-18260-18270-18280-18290-18300-18310-18320-18330-18340-18350-18360-18370-18380-18390-18400-18410-18420-18430-18440-18450-18460-18470-18480-18490-18500-18510-18520-18530-18540-18550-18560-18570-18580-18590-18600-18610-18620-18630-18640-18650-18660-18670-18680-18690-18700-18710-18720-18730-18740-18750-18760-18770-18780-18790-18800-18810-18820-18830-18840-18850-18860-18870-18880-18890-18900-18910-18920-18930-18940-18950-18960-18970-18980-18990-19000-19010-19020-19030-19040-19050-19060-19070-19080-19090-19100-19110-19120-19130-19140-19150-19160-19170-19180-19190-19200-19210-19220-19230-19240-19250-19260-19270-19280-19290-19300-19310-19320-19330-19340-19350-19360-19370-19380-19390-19400-19410-19420-19430-19440-19450-19460-19470-19480-19490-19500-19510-19520-19530-19540-19550-19560-19570-19580-19590-19600-19610-19620-19630-19640-19650-19660-19670-19680-19690-19700-19710-19720-19730-19740-19750-19760-19770-19780-19790-19800-19810-19820-19830-19840-19850-19860-19870-19880-19890-19900-19910-19920-19930-19940-19950-19960-19970-19980-19990-20000-20010-20020-20030-20040-20050-20060-20070-20080-20090-20100-20110-20120-20130-20140-20150-20160-20170-20180-20190-20200-20210-20220-20230-20240-20250-20260-20270-20280-20290-20300-20310-20320-20330-20340-20350-20360-20370-20380-20390-20400-20410-20420-20430-20440-20450-20460-20470-20480-20490-20500-20510-20520-20530-20540-20550-20560-20570-20580-20590-2060

Eliminates 5 Per Cent Tax from Bill

Senate Practically Rewrites Revenue Measure —Second-class Postage Clause Compromised

WASHINGTON, D. C., May 28—It is being generally asserted around the Capital that when the war revenue bill is rewritten by the Senate committee on finance and introduced in the Senate its father, Chairman Kitchin of the House ways and means committee, will not recognize it.

These predictions are being based upon the statement by members of the Senate committee that the revenue measure will be revised and rewritten along lines entirely different from the House bill. The elimination of the provision providing for a 5 per cent tax on certain manufactures and that which proposes an increased rate on second class postage matter is assured now.

The issue of short-term bonds is most likely to be suggested by the Senate committee to provide the revenue which the rejection of numerous sections of the House measure will make necessary.

Reduction Is Favored

All members of the Senate committee are said to regard material reduction of the House revenue measure's \$1,800,000,000 total as necessary and certain. The consensus in the committee apparently favors a total of between \$1,250,000,000 and \$1,500,000,000, determination of the exact amount to await detailed consideration of the bill.

Committee sentiment undoubtedly is strongly against what has been termed the House taxation of special industries. For the motor vehicle manufacturers' tax, a flat, graduated annual tax upon machines, whether in possession of manufacturers, distributors, or individuals, ranging from \$2 for cheap cars to \$20 or \$25 for high-priced ones is under consideration. Final action on this proposition, though, is entirely in doubt, the only apparent certain action being the elimination of the 5 per cent tax.

Adoption with little change of the income tax schedules of the House bill other than the retroactive provision is said to have been virtually decided upon by the committee. The increase of about one-fourth taxes on incomes over \$10,000 provided in the Lenroot amendments is opposed strongly. Elimination of the retroactive tax on 1916 incomes, Senator Simmons estimated, alone would result in reduction of the House bill's tax levy by \$108,000,000.

Newspapers and magazines have fought vigorously the proposed zone system increase, declaring they would be ruinous to many publications. The loss of revenue by elimination of the section will be partly if not wholly recouped, the committee be-

lieves, by the proposed 2 per cent tax on all advertising.

A fair excess profits tax principle, the committeemen say, will be adopted, which will relieve this year's tax burden upon business interests generally and provide a more equitable basis of taxation and also increase by many millions the net revenue returns.

Some corporations have complained that not until last year or this have they made normal profits. While not finally decided, the committee apparently favors retaining the House rate of 16 per cent on excess profits over earnings of 8 per cent but with invested capital abandoned as the basis of taxation calculation and the period of years' average substituted.

Consideration is being given a tax on parcel post packages smaller than that on express shipments. A parcel post tax, senators say, would be considered a freight rather than a postal tax.

In deciding to strike out the second class postage zone increase, the committee believed this is more a matter of postal administration than of taxation.

Nation's Dealers Unite

WASHINGTON, D. C., May 26—The first steps in the formation of the National Automobile Dealers' Association were taken last night in the New Willard hotel by the representatives of a number of associations

in large cities, who are here opposing the proposed 5 per cent tax on motor cars. Their opposition thus far promises to have some results.

To push through the national association movement a committee was formed, the chairman of which is George W. Browne, Milwaukee, who distributes the Overland in Wisconsin. The secretary is Ernest T. Conlon, secretary of the Grand Rapids association. This committee is to get in touch with all the associations throughout the United States and arrange for a general organization meeting before Aug. 1. At that time the work will be perfected and permanent officers chosen.

To draft a tentative constitution and by-laws these men were made a committee: G. A. Will, attorney for the Minneapolis association; Bart J. Ruddle, secretary of the Milwaukee association; Ernest T. Conlon, secretary of the Grand Rapids association; Edwin B. Bodley, attorney for the Chicago association, and E. E. Peake, secretary of the Kansas City association.

The organizations which sent representatives to Washington to oppose the tax and which were represented at the time of the association meeting are: Minneapolis Automobile Trade Association, G. A. Will, attorney; Milwaukee Automobile Dealers, Inc., George W. Browne, director, and Bart J. Ruddle, secretary; Kansas City Motor Car Dealers' Association, Albert T. Clark, president, and E. E. Peake, secretary; Omaha Automobile Trade Association, represented by its neighboring Kansas City association; Chicago Automobile Trade Association, Edwin B. Bodley, attorney; Grand Rapids Automobile Business Association, Ernest T. Conlon, secretary; Columbus Automobile Trade Association; Harry J. Schwartz, director; Indianapolis Automobile Trade Association, E. W. Steinhart, vice-president; Scott County—Davenport, Iowa—Automobile Trade Association, Gardner Smith, secretary; Washington Automobile Trade Association, S. L. Grogan, secretary; San Francisco and the Pacific Coast, William Hughson.

ENGLAND BANS RUBBER IMPORTS

New York, May 25—England has declared an embargo on the importation of rubber goods into that country except under the license of the board of trade. From now on, only Government tires will be allowed in.

Shipments to Scandinavian countries, formerly by way of London, are now through Halifax. Licenses, however, must still be secured in London, as before.

Cabinet Officers Sound Call to War

Emphasize Urgency of the Country's Needs Before Editorial Conference of Business Papers

WASHINGTON, D. C., May 26—The co-ordination of every resource and every effort of every American toward the prosecution of the war if it is to be successful is the message to the reading public brought by the members of the President's cabinet and the Council of National Defense to the editors of 200 class, trade and technical publications yesterday. This message was the burden of the talks of cabinet members and others highest in government councils before the Editorial Conference of Business Papers, arranged by the Associated Business Papers editors to learn first hand how they could best serve their country. The object of the conference as given on the program is:

"To promote the more effective use of the business energies of the country by a closer coöperation of the business press with the government."

Franklin K. Lane, Secretary of the Interior, emphasized the fact that America is not fighting for an idea only but for something more vital—it is fighting for this country to prolong its life as a people's government.

A Conflict of Smokestacks

Secretary of War Newton D. Baker in a stirring talk said that this is a conflict of smokestacks, a war of flywheels—that the problem is to organize and equip the army without disorganizing industry.

Secretary of the Navy Josephus Daniels outlined the "Needs of the Navy" and made the point that the navy needs ideas—it needs every effort of inventors, scientists and engineers. America has taken the offensive in the war—not the defensive—and the slogan of the navy is the words of Admiral Farragut: "Damn the Torpedoes—Go Ahead."

Secretary of Commerce William C. Redfield, after telling what his department is and has been doing in the development and popularization of new foods, mentioned the fact that there were many things the government cannot take the public into its confidence on for reasons of public safety but that "Silence usually is an indication of action in a time like this."

Secretary of Labor William B. Wilson emphasized the national shortage of farm labor for the approaching harvest and urged a nation-wide drive on the harvest—an extension of the old barn-raising idea.

The Department of Agriculture was represented by Doctor Pearson, president Iowa State Agricultural College, who told of the value of farm tractors in assisting the nation in meeting the needs for increased food supplies and stated that tractors are being operated in Kansas in 24-hr. shifts

continuously, carrying searchlights for night work, and that the department had placed tractor experts at convenient points so that in case of tractors breaking down there could be men on hand in a few hours.

Probabilities of the control of operation of passenger cars for pleasure purposes on account of fuel shortage and the need of adequate supplies for military work was brought out by Van H. Manning, director U. S. Bureau of Mines and a member of the Council of National Defense.

Food Administrator Herbert Clarke Hoover, the man who probably will be in control of the food of the nation under the

WOMAN MOTOR LABOR INCREASES

Milwaukee, Wis., May 26—The employment of women in places that always have been occupied by men is growing in Wisconsin, and the motor car industry is taking part in the pioneering work that must be done to provide for the possible contingency of a shortage of labor growing out of the war.

A special report on women labor in workshops has just been issued by the Industrial Commission of Wisconsin. It says that the Nash Motors Co., Kenosha, Wis., already has started to place women in its core-room. In Milwaukee, the Cutler-Hammer Mfg. Co., Geuder, Paeschke & Frey Co., and other large concerns closely identified with the motor car, parts and equipment industry not only are employing women in the shops in places usually filled by men, but they are advertising in the newspapers for more women for such purposes. The Allis-Chalmers Mfg. Co., Milwaukee, now employs a large number of women on mica-winding and other electrical construction of a light nature.

It is stated that the reduction of the output of confections, due to economizing by consumers, has released hundreds of girls and women to other industries. There are no restrictions regarding employment of women in Wisconsin, excepting those prohibiting their employment in mines and quarries.

ALTER COMPANY BANKRUPT

Plymouth, Mich., May 28—The Alter Motor Car Co. was judged bankrupt by Judge Arthur J. Tuttle, last Friday, and the disbursement of the company's assets was referred to Lee E. Joslyn, referee in bankruptcy. Creditors of the defunct company are the Remy Electric Co. of Indiana, Carr Fastener Co. of Massachusetts, and the General Spring & Wire Co., of Michigan.

necessities bill, was very emphatic that this is to be a war of attrition—its end will come and come only when we can starve our enemies to the point where they must give in. That means a long war—two or perhaps five years more.

Frank Scott, chairman munitions board, Council of National Defense, gave the keynote of his message when he stated that modern war is a war of the four Ms—Men, Metal, Machinery and Money.

Franklin H. Martin, in charge of Red Cross work, medicine and sanitation, Council of National Defense, brought out the fact that the mortality on the European front was higher among Red Cross workers than any other arm of the service, aviators and front-line trench fighters not excepted. He told of the wonderful work the motor ambulances are doing.

Coöperation among the railroads to expedite government shipment for both our own use and that of our allies was outlined by Howard Elliott of the railroad war board of the Council of National Defense.

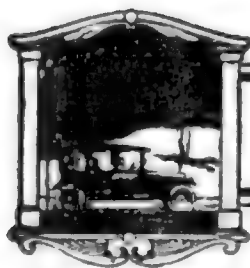
Our Metal Resources

Our metal resources were dealt with by George Otis Smith, director of the U. S. Geological Survey, who made the encouraging statement that new discoveries of ore and better methods of refining were keeping pace with the increasing demand to a much greater extent than might have been anticipated.

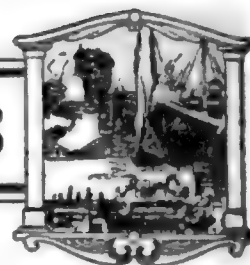
Special plea for the popular subscription to the Liberty Loan bonds rather than having it taken up by financial interests was made by Lewis B. Franklin of the Treasury Department, for the moral effect on allies and enemies, who emphasizes the fact that of this money loaned to our allies every cent comes back—is spent in this country.

Francis E. Peabody, chairman of the committee on coal production of the Council, told how the coal men are pooling their shipments to conserve transportation. Chairman George Creel of the committee on public information, popularly known as the censorship board, promised most complete coöperation with the business press and put it on its honor in the matter of state secrets.

The government is organizing for new business, the business of war, and our success will be measured by the degree of our organization. Americans must learn to economize—not necessarily by buying less but by cutting out waste—was the message of Frank A. Vanderlip, president National City Bank of New York, to the country through the editors.



EDITORIAL PERSPECTIVES



Will Federal Replace State Licences?

THE proposed establishment of a federal licensing arrangement may prove to be a stepping stone to one of the things for which organized motordom has been striving for many years. The national emergency may call into permanent establishment a federal license, which after the war, or perhaps earlier, may

supersede the state and municipal taxes. Federal licenses in lieu of state registration is a consummation for which all motorists have been hoping. It is within the bounds of probability that after the war this may come about. It may even come before then.

The Motorist's Service

THAT motorists who are not called to the colors either in military or civilian service for the government in the war will have the opportunity to do their bit in a way as essential, if not as spectacular as if they were fighting at the front seems to be certain. Motorists are going to be called upon to do a large share in furnishing the sinews of war in the drain upon their pocketbooks, in the operation of their cars, unless all signs fail.

■ ■

IF, as seems most probable at this writing, the House recommendation of a 5 per cent tax on cars and tires at the source is superseded in the general tax bill by the recommendation of the Senate that the tax be placed upon owners as a direct federal license fee based upon horsepower, weight, carrying

capacity or some combination of these the motorist will have to make a direct contribution to the cause as a motorist. This, in all probability, will be in addition to contributions to state and city funds which he has been making through state license fees and city wheel taxes.

■ ■

OTHER direct contributions which he may be called upon to make, probably will include taxes on tires and on gasoline—either by a direct tax or through higher prices, some of which will go to the government for the carrying on of the war. If the necessities bill becomes a law the motorist may be restricted as to the amount of fuel he may use per week for pleasure purposes.

Status of Liberty Loan

MOTORISTS of America should need little explanation to enable them to recognize the Liberty Loan as an opportunity to get in on the ground floor. Its patriotic purpose does not lessen its desirability as an investment. The loan as an investment for small holders has not received a very great amount of publicity. The chief effort so far has been through appeal to the patriotism of the people.

■ ■

THE government does not ask the American public to risk its savings—on the contrary it offers a tax-free investment at an interest rate better than that of a savings bank, an investment whose value, in the opinion of financial experts, is certain to increase steadily as the bonds approach maturity. This is not an appeal to the mercenary instincts of motorists, but is only put forward to emphasize the fact that to do your bit in the purchase of Liberty bonds does not entail financial loss.

■ ■

NO OTHER investment is more sure. When you buy a Liberty bond you not only pay a tribute to the flag but obtain for yourself the safest investment in the world, for Uncle Sam is behind this bond issue and he is worth \$225,000,000.

READ what the Secretary of the Treasury, William G. McAdoo, had to say on the war and the war loan May 14 of this year. He said:

"Wars cannot be conducted without money. It is the first thing to be provided. In this war it is the most immediate help that we can give. We must not be content with a subscription of two billion dollars—we must oversubscribe this loan as an indication that America is stirred to the depths and aroused to the summit of her greatness in the cause of freedom. Let us not endanger success by complacent optimism. Let us not satisfy ourselves with the reflection that someone else will subscribe the required amount. Let every man and woman in the land make it his or her business to subscribe to the Liberty loan immediately, and if they cannot subscribe themselves, let them induce somebody else to subscribe. Provide the Government with the funds indispensably needed for the conduct of the war and give notice to the enemies of the United States that we have billions to sacrifice in the cause of Liberty.

"Buy a Liberty bond to-day; do not put it off until to-morrow. Every dollar provided quickly and expended wisely will shorten the war and save human life."

Help Win the War—Buy a Bond

See Page 18 of this issue



Your Business Is WAR

BUSINESS men in all lines are speeding up to learn the WAR will affect their business. This is natural, but is less than half the story. The real point of it all is—

How Will Your Business Affect the War?

HOW can your business be arranged to conserve men, money and material for your country's need in WAR? Last Friday members of the President's Cabinet and the Council of National Defense—members of the biggest men of the Republic charged most directly with the successful prosecution of the WAR, and more closely in touch than any other men in America with the real inside facts of the country's aims and needs—told 118 editors, representing the business and trade press of the United States, what these papers can do in aiding their country. Though presented in seventeen different ways, the message of these seventeen men was the same—"Give your readers this message:

"You Are at War"

—every other consideration must be subordinated. Americans do not realize it yet, but they will. The more quickly Americans make up to what modern WAR means, the more quickly the WAR will end.

Next Week

War Is Spelled With These M's—Men—Money—Materials

Plans Huge Air School

Government Will Spend \$1,-
000,000 on Joy Aviation
Field Equipment

To Test Airplanes and Seaplanes
on Grounds

DETROIT, May 26—The Joy aviation field near Mount Clemens, Mich., which has just been purchased by the government from H. B. Joy, has witnessed considerable activity during the last few days. Plans are being arranged to expend the \$1,000,000 which the government has appropriated to fit this land for aviation work. The plans for the numerous structures were made by Albert Kahn, architect, of Detroit, the war department, for the first time in its history, employing an outside architect. This aviation school is one of nine which the government will build in various parts of the country. Mr. Kahn's plans are standard. He was recently made architect of the aviation section of the signal corps of the United States army.

Airplanes and seaplanes will be tested on these grounds. Even a church will be located on the property. The government has purchased 1700 acres for the village, which will have approximately 1000 inhabitants at the start.

MAY GET WAR ORDERS

Grand Rapids, Mich., May 28—It is possible that two or three motor truck manufacturing companies in this city will get orders for motor trucks for the United States war department service. George F. Sweet, manager of the United Motors Co., the largest truck maker in Grand Rapids, is now in Washington consulting with government officials about the kind of truck needed. It is altogether probable that the largest order taken in Grand Rapids will be extended to the United Motors Co. This company now has its trucks in the service of England and France and has numerous orders from those countries, which it will not be able to fill for some time. The company recently started the manufacture of a motor tractor which the government may find suited to military purposes. The Michigan Hearse & Motor Co. also has been asked to bid on light 1-ton trucks. The company makes hearses and ambulances but it is said the company could turn out at least 200 1-ton trucks by Jan. 1, to fill a government order.

3500 PLANES THIS YEAR

Washington, D. C., May 26—With Howard E. Coffin in charge of the newly organized aircraft production board, created by the Council of National Defense, plans are being organized to produce planes and

aviators. It is estimated that 3500 planes and 6000 aviators will be available before the end of the year. Next year the program of aircraft production is to be even larger, and this, of course, means that the demand for airmen will increase proportionately. Associated with Mr. Coffin on the board are S. D. Waldon, former vice-president of the Packard Motor Car Co.; George O. Squier, chief signal officer U.S.A.; Rear-Admiral D. W. Taylor, chief of the Bureau of Construction, U.S.N.; E. A. Deeds of the Dayton Engineering Laboratories Co.; and R. L. Montgomery of Montgomery, Clothier & Taylor, Philadelphia, who will serve as financial advisor of the board.

MECHANICS FOR OVERSEAS DUTY

Detroit, May 26—The Cadillac Motor Car Co., Packard Motor Car Co., Hudson Motor Car Co., Ford Motor Co., Studebaker Corp., Chalmers Motor Co., Continental Motors Corp. and the Northway Motors Co. each will select certain mechanics from their organization to complete the plan of the United States government to send expert mechanics for a course of extensive training in the airplane factories of France. The Cadillac Motor Car Co. also has been requested to furnish two combination chauffeurs and mechanics to drive cars for the marine corps in France. The two drivers will be enrolled for the term of the war with the rank of sergeant. They will receive \$38 a month with \$15 for extras and 20 per cent additional for foreign service. Their board, and clothes and transportation will be furnished by the government. The mechanics going to the airplane factories will receive \$4 a day and transportation and will retain a civilian status.

RICKENBACHER GOES TO CAPITAL

Detroit, May 26—Eddie Rickenbacher has been called to Washington for consultation regarding the starting of aviation practice work by the racing drivers' aviation corps which was formed through the efforts of Rickenbacher.

MACKIE REPORTS FOR DUTY

Waukesha, Wis., May 26—Mitchell Mackie, sales manager of the Waukesha Motor Co., Waukesha, Wis., who recently was commissioned a captain in the quartermaster officers' reserve corps, in charge of motor transport for the army, was ordered to report at Fort Sam Houston, Tex., and has left for the South.

MARMON GETS COMMISSION

Indianapolis, Ind., May 28—Howard C. Marmon, president of Nordyke & Marmon, manufacturers of the Marmon 34, has been called to Washington to take complete charge of the development of engines for the army airplane service. Mr. Marmon has accepted the call of the government and has been given the rank of captain.

Paris May Limit Traffic

War Measure Would Restrict
All Unnecessary Motor
Travel

Protest Cites Previous Requisitions
of Cars

PARIS, May 1—All motor traffic not necessary for national defense will be forbidden in France, if the recommendation of the official gasoline saving committee is carried into effect. This committee has been appointed by the Government to deal with the whole question of gasoline, kerosene and oil supplies throughout France. A few exceptions are provided for in the proposed restrictive scheme which has been sent up to the government for signature. It is intended to leave in use a certain number of taxicabs, motor omnibuses, senators' cars, and cars belonging to members of the diplomatic corps.

This is the first time since the outbreak of the war that restrictive measures have been proposed against motor cars in France. Gasoline has increased in price, but this is due entirely to higher freight and insurance. Louis Renault, president of the car manufacturers' syndicate, is heading a protest against the proposed restriction. He points out that private car traffic has been reduced to a minimum by reason of the requisition of cars and the mobilization of drivers.

EXPORT GAS PRICES UP

New York, May 25—Prices on gasoline for export have been advanced 2 cents a gallon by the principal refining interests. Gasoline for foreign shipment is now quoting at 36¼ cents a gallon for the 68-72 grade in ten to ninety-nine cases, there being 9¼ gal. to a case. In 100 to 199 case lots, the price per gallon is 36 cents, and in 200 to 299 case lots, the price is 35¾ cents. The 72-76 grade per gallon in the ten-ninety-nine case lot, is 40¼ cents. The other two lots are 40 and 39¾ cents respectively.

This is the first change that has been made in quotations of any of the refined products for several months and is attributed to the continued heavy foreign demand in conjunction with the growing acuteness of the situation with reference to supplies. Another important reason for the rise is the present shortage of labor.

CHICAGO RECRUITS CHAUFFEURS

Chicago, May 28 — Since recruiting of truck drivers and mechanics began in the Quartermaster's Department three weeks ago, six companies have been organized and the seventh is more than half completed. According to Captain Webster there have been six companies of thirty-five men each and twenty men of the seventh company recruited to date. Each

company consists of thirty-two sergeant chauffeurs, among whom are one truck master and three assistants, two mechanics and a cook. Trucks that have been in use on the border are arriving at the various training camps, one trainload having been checked in at Fort Sheridan last Saturday. With each fleet of trucks coming up from the border are twelve or thirteen men who have seen service, and they will be distributed through the various new companies recruited so that there will be experienced men with each crew.

BOSTON TRADE SELLS BONDS

Boston, Mass., May 26—The Boston automobile trade comprising the dealers, tire, garage and accessory forces, held a meeting yesterday and picked out June 4 as Liberty Bond Day. On that day a concerted effort will be made to sell the bonds to the different forces. Some of the dealers have done their selling already, John H. Johnson of the Buick called a meeting of his forces Monday and he sold bonds to every one of the eighty-five employees on his staff.

ASKS EIGHT MOTOR COMPANIES

Detroit, May 26—Detroit has been asked by the central department at Chicago to furnish eight companies for the motor truck section of the quartermaster's reserve corps. This means the raising of a regiment made up of truck drivers and mechanics. Captain William E. Dunn of the United States field artillery will superintend the work.

COLES FOR LIBERTY BONDS

Indianapolis, Ind., May 26—The Cole Motor Car Co. has taken a new step in opening avenues for negotiating the Liberty Loan by offering to accept such bonds in partial or complete payment for its customers' purchases. The plan provides for the acceptance of Liberty bonds at \$102 for each \$100 bond. The bonds may be redeemed by the customers later.

WILLYS' BOAT TO U. S.

Toledo, Ohio, May 28—John N. Willys, president of the Willys-Overland Co., has notified the Bath Iron Works at Bath, Me., to discontinue the fitting out of his yacht which he is having built at a cost of more than \$500,000. Mr. Willys will have the vessel turned over to the government for war work. It resembles a torpedo boat destroyer and will make 30 knots an hour.

MAKES TRUCK ENGINES ONLY

Muskegon, Mich., May 28—The plant of the Continental Motors Corp. at Muskegon, is to be given over entirely to the production of truck engines. It is stated that the company has received a very large order from the United States government, and that for this reason the manufacturing of motors for passenger cars will be taken care of exclusively at the Detroit branch.

Mexico Truck Use Grows

Carloads of Vehicles Have Been Imported During Last Few Weeks

Burro Is Being Transplanted by Motor Transportation

LAREDO, Tex., May 25—An unexpected and rapidly growing demand for motor trucks is coming from Mexico, and many carloads of these vehicles have entered that country through the El Paso, Eagle Pass and Laredo ports of entry during the last three or four weeks. The shipments are increasing constantly, the demand coming chiefly from the larger mining companies that are reopening their respective properties. Most of the orders for motor trucks for Mexico shipment are placed with dealers in cities and towns on or adjacent to the Rio Grande, particularly San Antonio and El Paso. Recently a mining company that operates a large property in the State of Chihuahua placed an order for eight Jordans and the vehicles were shipped promptly.

It is stated by the American representatives of different truck manufacturing companies who have been on trade trips into Mexico during the last few weeks that everything points to a very heavy business in this line in that country as soon as normal conditions are restored there. The larger foreign-owned mining companies plan to utilize trucks instead of the slow-moving burro wherever the roads are good enough to afford the operation of the motor vehicles. It is interesting to note that the motor truck has had its development chiefly during the last six years that mining operations in Mexico have been suspended. In the oil-producing territory around Tampico many American companies are installing motor trucks for the transportation of supplies and lighter machinery to the different camps.

ELECTRIC INTERESTS MEET

Hot Springs, W. Va., May 25—About forty representatives of the eleven company members attended the first annual meeting of the Automotive Electric Association in this city. O. F. Conklin, Remy Electric Co., chairman of the standardization committee, made his report, appointing various sub-committees to handle subjects of importance to the industry. A sub-committee has been appointed to handle the work in connection with supplying the government with electrical equipment for use on trucks and airplanes.

Efforts were made at the meeting to arrange some manner in which the patent situation pertaining to the industry could be adjusted amicably to the best interests of the members and their customers.

This association was formed last April

and is composed of manufacturers of all automotive electric accessories, as follows: Dayton Engineering Laboratories Co., Dayton, Ohio; Dyneto Electric Corp., Syracuse, N. Y.; Electric Auto Lite Co., Toledo, Ohio; The Leece-Neville Co., Cleveland, Ohio; North East Electric Co., Rochester, N. Y.; Remy Electric Co., Anderson, Ind.; The Robbins & Myers Co., Springfield, Ohio; Splitdorf Electric Co., Newark, N. J.; U. S. Light & Heat Co., Niagara Falls, N. Y.; Wagner Electric & Mfg. Co., St. Louis, Mo.; and Westinghouse Electric & Mfg. Co., Pittsburgh, Pa.

The officers are: President, G. B. Griffin, Pittsburgh; vice-president, C. O. Miner, Toledo; secretary, G. S. Cole, Cleveland; and treasurer, C. L. Amos, Syracuse.

TRIES OUT AIRPLANE ENGINE

Cincinnati, Ohio, May 28—Ralph de Palma, who owns the Packard airplane engine racing car, is experimenting with this engine while training for the speedway races here. De Palma is determining what improvements are necessary and is keeping the Packard company and the government advised.

TO MAKE GIANT AIR ENGINE

Buffalo, N. Y., May 26—G. C. Goode, English aviator, is supervising manufacture of a 350-hp. airplane engine at the Sterling Engine works. This company has purchased the American rights for the Sunbeam airplane engine twelve-cylinder 350-hp. and eighteen-cylinder 500-hp. engine and has taken over contracts for them. The contracts demand that operation of manufacture start by June 1. The new engine which Mr. Goode is working upon will weigh 1075 lb. and drive a bomber weighing 2200 lb. at a speed of 130 m.p.h. at an altitude of 14,000 ft. Mr. Goode states that present-day air fighting in Europe is done in an average altitude of 9000 ft.

LOCATE IN RELIANCE PLANT

Lansing, Mich., May 26—The Tractor Producing Co. and the Deussenberg Motors Corp. have located temporarily in the plant of the Reliance Engineering Co. The Tractor Producing Co. makes four-wheel drive trucks and four-wheel drive tractors. But one type of each is being made, the tractor being confined to 30 hp. and the motor truck to the three-ton type. The company has confined its business exclusively to Russia and France since the war started. The Deussenberg Motors Corp. builds engines for sub chasers, airplanes and tractors, and is affiliated locally in production with the tractor company, which takes a certain per cent of the engines made by the Deussenberg corporation.

LAWSON AIRCRAFT GETS PLANT

Green Bay, Wis., May 28—The Lawson Aircraft Co., recently organized by Alfred W. Lawson, has obtained its first factory and has refitted it for airplane construction.

The building contains 8000 sq. ft. of floor space and is expected to be ready for operation within three months. Besides this the company has taken over the use of two machine shops at Green Bay and two wood-working shops. The shops will have capacity for the employment of 1000 workmen altogether.

John Carisi, Brooklyn, N. Y., has been made factory superintendent. Lawrence Allison, formerly with the Curtiss, the Standard and the Burgess companies, is chief engineer, while Lee Wallace, who has had ten years' experience with airplanes, first with the Christoferson company in California and later with the Curtiss, is designer. Rudy Sanders, formerly with the Standard, is assistant designer.

NEW TRACTORS AT \$350

Tacoma, Wash., May 25—Henry Korvaar, a farmer, has designed a tractor specially for use on the Pacific coast, where the excessive rains render many types of tractors useless. The tractor is supplied by an 8-hp. gasoline engine, will plow a 17-in. furrow 8 to 9 in. deep and has a harrow attachment behind. Its weight is about 1400 lb. and it can be manufactured for \$350.

AUTOMOTIVE ELECTRIC BODY

New York, May 28—The recently organized Automotive Electric Association, which is an organization of concerns manufacturing starting and lighting apparatus, has organized itself for committee work, having taken this step at a meeting held in Pittsburgh. The organization has a large committee on standardization which is expected to co-operate with the Society of Automotive Engineers in this work. There are other committees on electrical equipment for airplanes and also electrical equipment for government trucks.

It is not known exactly what is going to be the complete scope of this organization with regard to the industry, but unquestionably it will have in mind the good of its membership in all matters. This organization is somewhat similar to one of the rim manufacturers. There have been one or two other organizations within the industry of a similar nature.

The following is the committee organization:

STANDARDIZATION COMMITTEE TO CO-OPERATE WITH S. A. E.

G. F. Conklin, Remy Electric Co., chairman.
W. A. Chryst, Dayton Eng. Lab. Co.
A. E. Doman, Dyneto Electric Co.
R. M. Leece, Leece-Neville Co.
C. F. Glichrist, Elec. Auto-Lite Co.
C. E. Wilson, Westinghouse E. & M. Co.
T. L. Lee, North East Elec. Co.
H. R. Stuart, Robbins & Myers Co.
A. H. Timmerman, Wagner Elec. Mfg. Co.
A. D. T. Libby, Spiltdorf Electric Co.

SUB-COMMITTEE ON ELECTRICAL EQUIPMENT FOR AIRPLANES—RESEARCH

W. A. Chryst, chairman.
R. M. Leece.
A. D. T. Libby.
C. E. Wilson.

SUB-COMMITTEE ON GOVERNMENT TRUCK EQUIPMENT—ADVISORY

T. L. Lee, chairman.
C. E. Wilson.
Harve R. Stuart.
A. D. T. Libby.

Pike Boosters End Tour

Colorado Springs Chamber of Commerce Party Motors Through 4 States

1900-Mile Sociability Run Started in Blizzard

COLORADO SPRINGS, Colo., May 26—It is seldom that such an extensive tour as that the Colorado Springs chamber of commerce just ended is begun under less favorable prospects, for two days before the start there was a foot of snow at Colorado Springs and the seven cars of khaki-clad enthusiasts started in a blizzard on their 1900-mile trip through Colorado, Kansas, Oklahoma and Missouri.

The sociability run was held to initiate the Albert Pike highway projected from Hot Springs, Ark., to the Pike's Peak region by Tulsa, Okla. The exact routing has not been determined, and many towns not on the itinerary of the Colorado Springs party sent delegations to urge inspection of their roads and scenery. Some towns of 800 inhabitants sent fifty business men 40 miles. The tour lasted eleven days and was the most successful of the similar events conducted in the last four years under the auspices of the Colorado Springs chamber of commerce. Every car made the complete circle trip, and there were no accidents or serious breakdowns.

The tourists followed the Santa Fe trail to Dodge City, Kan., where they were met by Vice-President C. H. McCollom of the Albert Pike Highway Association and piloted by him to the Oklahoma state line, where President Avery and Secretary E. B. Guthrie of the new highway met them. The route then was through Oklahoma, Enid, Guthrie, Oklahoma City, Okemah, Tulsa, Muskogee and Vinita, back to Joplin, Mo., and westward over the Oil Belt route through Pittsburg, Independence and Arkansas City to Wichita, Kan. The Meridian road was followed north through McPherson to Salina, the Golden Belt road through Russell, Ellis and Oakley to Colby, and the Pike's Peak Ocean-to-Ocean highway through Goodland, Limon and Calhan to Colorado Springs.

Only one stream had to be forded. This was between Pryor and Vinita, Okla. The cost of the tour was about \$5,000. Two Cadillacs, two Studebakers, a Packard, Hudson and Chandler were used. The average speed was about 30 m.p.h., and a system of red flags indicated turns and dangerous spots.

REORGANIZE F. R. P. COMPANY

New York, May 25—A reorganization, together with an increase of capital, of the Finley Robertson Porter Co., Inc., Port Jefferson, L. I., has been completed. This widening of the activities of the company

means a larger production and the introduction of additional capital to make such possible. The capital has been increased from \$100,000 to \$250,000 preferred stock of par value 100, carrying 8 per cent cumulative, and 10,000 shares common of no par value.

Under the broadened plans of the company production has already been started on a run of 100 F.R.P. cars. The price for the seven-passenger touring car has been increased from \$6,000 to \$7,000. The new cars are different from the old models in that sixteen-valve engines are used. The general engine design is the same as formerly with the exception of the sixteen-valve arrangement. Cylinder sizes are 4% by 6%, and the wheelbase is 140 in.

Finley R. Porter, who has been the directing spirit of the company since its organization, is president under the reorganization scheme. F. D. Veiller is vice-president, and R. C. Kay of Pittsburgh, is secretary and treasurer. These men, with Paul R. Towne, of Harris & Towne, attorneys, and J. S. Stubbs, comprise the board of directors.

BROWN SPRING OILER LICENSE

Cleveland, Ohio, May 25—The Brown Spring Oiler Co. has licensed the Babbitt Spring Oiler Co., the National Motor Supply Co. and the Lazarus Mfg. Co. to manufacture under one of its patents on spring leak lubricators.

STRAITS PROHIBIT IMPORTS

Washington, D. C., May 25—The Straits Settlements has prohibited the importation of motor vehicles. In the federated Malay States a 10 per cent ad valorem duty on motor cars has been established, according to a message from the American Consul General at Singapore.

G. M. STOCK TRANSFER APPROVED

New York, May 25—The transfer of the assets and business of the General Motors Co. of New Jersey to the General Motors Corp. of Delaware has been approved by the stockholders, and they have decided to retire the \$14,985,200 outstanding preferred stock of the company. The authorized preferred stock amounted to \$20,000,000.

The Delaware corporation has a total authorized capital stock amounting to \$102,600,000. Holders of the old preferred receive one and one-half shares of 6 per cent preferred in the General Motors Corp. for each share of 7 per cent stock owned. The old preferred to be retired is the stock which will not be exchanged for the new preferred.

SIX CLYDESDALE TRUCK MODELS

New York, May 25—Six models, including 5-, 3½-, 2-, 1½-, 1- and ¾-tonners, will be produced by the Clyde Cars Co., which has been organized through the merger of the Krebs Commercial Car Co.,



HELP Win the War

AMERICA looks to her people for the answer of this war. The billions to be raised by the Liberty bond issue could have been obtained direct from the large financial institutions. However, the mere raising of the money is not the sole purpose of the bond issue. America must show her allies and her enemies that the American people are behind her government in this.

NATION-WIDE POPULAR response to the nation's call for war funds by popular subscription to the bonds will show the world that the great masses of the people are backing the war. This will hearten our allies and give the lie to the contention of our enemies that the hearts of our people are not in the conflict. You who can and do not buy Liberty bonds every day will assign yourselves as guilty of giving aid and comfort to the enemy.

WHAT IS THE REAL SIGNIFICANCE OF THE LIBERTY LOAN?

THIS title of the new war finance plan is no mere alliteration, an sounding catch phrase. It is in reality a "liberty loan," for it represents the efforts of the United States to insure human liberty. Every dollar given to America through the Liberty loan is an investment in Security against Domination by a Power That Has No Regard for Individual Rights—that Values for the Exploitation of Humanity.

BUY A BOND



Overland's Gotham Building Unique

New York Structure Designed to Give Car Owners Quick Service at Reasonable Cost



New Overland service building just opened by Overland in New York

QUICK service. Economically designed. These are objectives in constructing the latest structure of any company ever installed in and made possible by the new service building just completed by the Overland company in New York. Recently, the building and its surroundings in this

built of concrete and steel, the sturdy legs, each four heavy dimensions of six by six in., the structure contains a total of slightly up to 10,000 sq. ft. of space, of which the main part of the main car service is located on the second floor about 10,000 sq. ft. of space, of which the main car service and is conducted by a company, Overland Inc., this structure and range in the first floor three garages, one and open

space. There also are two passenger elevators and four staircases for the quick delivery of parts.

Who has four bays the painting room, second floor, where repairs, check and heavy, expensive repairs, that is, machine in being special work only are done in these three, this, body shop, paint, parts and accessories, service, perspective view for new cars to be delivered, signs and lights, with the storage, third, general office and various departments.

On the third and fourth floors are found departments that speak of progress. The elevator, on the third floor, has two elevators in each one and in addition there are in the third floor departments provided with by

specialists in various classes of repair. The fourth floor also carries repair, machine and welding work. Overland believes it is possible to lift the repair from the chassis and turn it to the main department after the making repairs. The best parts from engine, timing, which are sent out of the building by sending a service hole in the chassis opening. The fourth floor has built into for storing in connection with the engine and chassis are covered by hanging from the ceiling. This enables the capacity of the floor.

The building means a striking improvement in efficient service. It is an example of modern service facilities expanded in the city center. It is the result of complete realization of the fact that service gives natural result in faster and better—it is not cheap a standard advantage in the service idea.

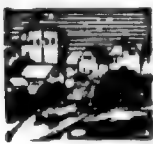
Service Facilities

The big feature of the building is the facilities for handling service. There is a standard plan for every job on every one of the many models produced by the Overland company so that the customer knows before he is there exactly what the work is to be and how. Furthermore it is possible to say with great precision just what the cost will be.

Efficient service was kept for over a year to determine just what each kind of work cost and the result is a fixed charge that can be determined. The time for making a standard repair is known to be accurate and the customer must know this. In this time in 40 per cent of the time is used to handle these problems. The last reason is that for a long distance when the business must require are necessary and before the work is known the owner is advised just what the charges will be and when he may have his car. After the repair work is finished and the car tested over in the street he is asked to call without or not the repair work was satisfactory. This gives the company a line on the success of the repair work and shows the interest in the customer. Next we think the company will be for complete repair and service from top and whether the work was done gratis or charged.

TO FIGHT TRAFFIC SPEEDWAY

Washington, Pa., May 14.—The Philadelphia Speedway Association has at last taken some definite steps in the direction of putting in completion the 1 1/2 mile track at Thompsons Gap. According to the work was carried on from the middle of January, and that this project was based on them. A meeting was held recently, and by consent of these present the efforts of the association were concentrated to make 100,000 to 150,000 and complete the speedway.



Routes and Touring Information



Quincy, Ill.—Denver—Sacramento

QUINCY, ILL.—Editor *MOTOR AGE*—Give a route from here through St. Joseph, Denver, Colorado Springs, Glenwood Springs, Salt Lake City to Sacramento.—E. B. Hillman.

From Quincy, Ill., drive to Hannibal, Mo., New London, Perry, Mexico, Columbia, Rocheport, New Franklin, ferry across Missouri River, Boonville, Arrow Rock, Marshall, Grand Pass, Waverly, Lexington, Wellington, Ripley, Independence, Kansas City, Kansas City, Kan., Bonner Springs, De Soto, Eudora, Lawrence, Topeka, Silver Lake, Roseville, St. Mary's, Wamego, Manhattan, Ogden, Fort Riley, Junction City, Chapman, Detroit, Abilene, New Cambria, Salina, Ellsworth, Wilson, Dorrance, Russell, Victoria, Hays, Yocemento, Ellis, Ogallah, Wakeeney, Quinter, Grainfield, Oakley, Colby, Brewster, Goodland, Ruleton, Kanorado, Burlington, Colo., Stratton, Selbert, Flagler, Limon, Ramah, Calhan, Colorado Springs, Pikeview, Monument, Palmer Lake, Greeland, Castle Rock, Sedalla, Littleton, Denver, Golden, Idaho Springs, Sulphur Springs, Kremmling, Glenwood Springs, Newcastle, Silt, Anders, Rifle, Rullson, Grand Valley, DeBeque, Palsades, Grand Junction, Fruita, Mack, Cisco, Thompson, Elgin, Green River, Woodside, Wellington, Price, Helper, Castle Gate, Colton, Thistle, Springfield, Provo, Pleasant Grove, American Forks, Sandy, Salt Lake City, Magna, Garfield, Grantsville, Josepa, County Well—water for radiator only—Fish Springs Ranch, Ibapah, Utah, McGill, Nev., Ely, Greentown, Reipetown, Eureka, Austin, Alpine Ranch, Sand Springs, Salt Wells Ranch, Fallon, Hazen, Wadsworth, Reno, Verdi, Truckee, Colfax, Auburn, Roseville to Sacramento.

Volumes 5, 7 and 8 of the Automobile Blue Books published by the Automobile Blue Book Pub. Co., 910 South Michigan Avenue, Chicago, contain complete running directions for this trip as well as information on points of interest, condition of roads, etc.

Coffeyville, Kan.—Jacksonville, Ill.

Coffeyville, Kan.—Give best route from here to Jacksonville, Ill.—P. P. Cable.

From Coffeyville, proceed to Independence, Cherryvale, Chanute, Petrolia, Humboldt, Iola, Ottawa, Wellsburg, Edgerton, Olathe, Lenexa, Overland Park, Waldo, Mo., Kansas City, Bellevue, Liberty, Prathersville, Excelsior Springs, Lawson, Polo, Cowgill, Plymouth, Ludlow, Utica, Chillicothe, Laclede, Brookfield, Bucklin, Macon, Clarence, Lenton, Shelbyville, Lakenan, Monroe, Oakwood, Hannibal, Kinderhook, Barry, Hadley, Baylis, New Salem, Griggsville, Valley City, Bluff to Jacksonville.

Vols. 7 and 5 of the Automobile Blue Book published by the Automobile Blue Book Pub. Co. contain complete running directions for the above trip.

Henryetta, Okla.—Harrisburg, Pa.

Henryetta, Okla.—Editor *MOTOR AGE*—Am interested in a route from here to Harrisburg, Pa.—R. B. F. Hummer.

From Henryetta, drive to Dewar, Hoffman, Hitchita, Wainwright, Muskogee, taking the Jefferson Highway from there to Joplin, Mo., From Joplin the route lies through Diamondville, Wentworth, Pierce City, Verona, Aurora, Marionville, Billings, Republic, Springfield, Galloway, Rogersville, Diggins, Seymour, Mansfield, Macomb, Norwood, Mountain Grove, Dunn, Cabool, Simmons,

Houston, Raymondsville, Licking, Edgar Springs, Rolla, St. James, Cuba, Leasburg, Bourbon, Sullivan, Anaconda, St. Clair, St. Louis, East St. Louis, Collinsville, Troy, Highland, Greenville, Mulberry, Hagerstown, Vandalia, Altamont, Effingham, Greenup, Martinsville, West Terre Haute, Terre Haute, Brazil, Plainfield, Indianapolis, Greenfield, Knightstown, Dunreith, Germantown, Centerville, Richmond, Ind., Eaton, Ohio, Dayton, Harshman, Springfield, Columbus, Granville, Newark, Linnville, Zanesville, Cambridge, Washington, Morristown, Bridgeport, Wheeling, W. Va., Elm Grove, West Alexander, Pa., Clayville, Washington, Houston, Canonsburg, Bridgeville, Carnegie, Pittsburgh, Sardis, Mamont, Saltsburg, Indiana, Pine Flats, Barnesboro, Carrolltown, Altoona, Juniata, Bellwood, Tyrone, Schoenberger, Alexandria, Smithfield, Huntingdon, Mill Creek, Lewistown, Thompsonstown, Millerstown, Liverpool, New Buffalo, Speeceville, Coxestown, to Harrisburg.

St. Louis, Mo.—Yellowstone—Los Angeles

St. Louis, Mo.—Editor *MOTOR AGE*—Furnish routing from here to Los Angeles via Yellowstone Park, Glacier Park, Columbia River Highway, Seattle, Portland, San Francisco, Yosemite and Sequoia National Park.—Reynold F. Buder.

From St. Louis, drive to Dwyer, Ellisville, Gray Summit, Washington, Berger, Hermann, Morrison, Chamola, Osage City, Jefferson City, Centertown, McGirks, California, Clarksburg, Tipton, Otterville, Sedalla, Knobnoster, Montserrat, Warrensburg, Centerville, Holden, Strassburg, Pleasant Hill, Lee's Summit, Kansas City, Kansas City, Kan., Leavenworth, Lowemont, Atchison, Lancaster, Huron, Everest, Hiawatha, Falls City, Neb., Verdon, Auburn, Nebraska City, Plattsmouth, LaPlatte, Fort Crook, So. Omaha, Omaha, Elkhorn, Waterloo, Fremont, Ames, North Bend, Schuyler, Richland, Columbus, Duncan, Clarke, Central City, Chapman, Grand Island, Alda, Shelton, Gibbon, Kearney, Willow Island, Gothenberg, North Platte, Sutherland, Paxton, Ogallala, Brule, Bigspring, Chappell, Lodgepole, Sidney, Kimball, Bushnell, Cheyenne, Chugwater, Wheatland, Uva, Glendo, McKinley, Douglas, Glenrock, Casper, Stone Ranch, Johnsons Ranch, Powder River Ford, Waltman, Armito, Lost Cabin, Reids Ranch, Thermopolis, Kirby, Chatham, Neiber, Worland, Manderson Basin, Otto, Burlington, Cody, into the eastern entrance to Yellowstone Park, through the park and out at Yellowstone Station, then to Lake Post Office, Hutchins, Jeffers, Ennis, Virginia City, Ruby, Sheridan, Twin Bridges, Silver Star, Butte, Anaconda, Phillipsburg, Maxville, Hall, Drummond, Bearmouth, Bonita, Clinton, Missoula, Ravalli, Ronan, Polson, Big Arm, Elmo, Dayton, Rollins, Kalispell, Belton, Appar, Glacier National Park. Return to Missoula and proceed to Huson, Alberton, Superior, St. Regis, Deborgia, Salt Lake, Mullan, Ida., Wallace, Kellogg, Kingston, Cataldo, Couer d'Alene, Spokane, Wash., Deep Creek, Reardan, Creston, Wilbur, Almira, Coulee City, Spencer, Douglas, Waterville, Orondo, Wenatchee, Vantage Ferry, Ellensburg, Wash., Cle Elum, Easton, Snoqualmie Pass, Northbeno, Snoqualmie Falls, Fall City, Camp on, Redmond, Kirkland, Seattle, Georgetown, Riverton, Orilliam, Sumner, Ardena, Tacoma, Lakeview, Olympia, Tumwater, South Union, Grand Mound, Centralia, Chehalis, Cowlitz, Toledo, Castle Rock, Kelso, Carrolton, Kalama, Martins Bluff, Woodland, Sarah, Felida, Vancouver,

Portland, Ore., Oregon City, Salem, Liberty, Jefferson, Albany, Tangent, Shedd, Halsey, Harrisburg, Junction City, Eugene, Goshen, Walker, Cottage Grove, Drain, Yoncalla, Oakland, Edenbower, Roseburg, Myrtle Creek, Riddle, Canyonville, Summit, Wolf Creek, Grants Pass, Rogue River, Gold Hill, Central Point, Medford, Ashland, Yreka, Dunsuir, Castella, LaMoine, Redding, Anderson, Cottonwood, Red Bluff, Corning, Orland, Willows, Maxwell, Williams, Arbuckle, Woodland, Dixon, Vacaville, Fairfield, Rockville, Cordella, Benicia, Martinez, Walnut Creek, Oakland, San Francisco, Manteca, Salida, Modesto, Empire, Waterford, LaGrange, Yosemite, Fort Monroe Checking Station, Chinquapin Station, Aldercreek Station, Wawona, Fresno Flat, Coarse Gold, Fresno. Inquire at Fresno as to best route to Sequoia National Park. From Fresno the route continues to Los Angeles, through Fowler, Kingsburg, Tulare, Delano, McFarland, Bakersfield, Newhall, San Fernando, Burbank, Tropic, to Los Angeles.

Volumes 5, 7 and 8 of the Automobile Blue Books published by the Automobile Blue Book Pub. Co., 910 S. Michigan Ave., Chicago, contain complete running directions for this trip.

Vinton, Iowa—El Paso, Tex.

Vinton, Iowa—Editor *MOTOR AGE*—Outline routing from here to San Antonio, Tex., by way of Kansas City and McAlester, Okla.—D. C. Knopf.

From Vinton go to Shellsburg, Palo, Cedar Rapids, Walford, Middle Amana, Marengo, Victor, Brooklyn, Grinnell, Kellogg, Newton, Colfax, Des Moines, Bethany, Bridgeport, Pattonburg, Winston, Cameron, Plattsburg, Trimble, Smithville, Gashland, Kansas City, Harrisonville, Adrian, Butler, Rich Hill, Arthur, Horton, Nevada, Moundville, Liberal, Nashville, Galesburg, Joplin, Galena, Afton, Pryor, Wagoner, Muskogee, Crowder, McAlester, Durant, Denison, Sherman, McKinney, Dallas, Grand Prairie, Dalworth, Arlington, Handley, Fort Worth, Weatherford, Mineral Wells, Caddo, Breckenridge, Albany, Hamby, Abilene, Trent, Escapa, Sweetwater, Roscoe, Lorraine, Colorado City, Westbrook, Coahoma, Big Spring, Stanton, Midland, Grandfalls, Pyote, Pecos, Toyah, Kent, Van Horn, Sierra Blanca, Fabens, Belen, Yaleta to El Paso.

Mansfield, Ill.—Memphis, Tenn.

Mansfield, Ill.—Editor *MOTOR AGE*—What is the best route from here to Memphis? Where do we cross the Ohio river?—N. Patterson.

From Mansfield go to Lodge, Monticello, Bement, Oakley, Decatur, Mount Auburn, Taylorville, Vanderville, Raymond, Litchfield, St. Louis, East St. Louis, Ill., Edgmont, Belleville, Freeburg, New Athens, Lensburg, Old Town, Marissa, Tilden, Coulterville, Pinckneyville, Vergennes, Murphysboro, Carbondale, Makanda, Cobden, Anna, Mill Creek, Tamms and Unity to Cairo. The Ohio river is crossed by ferry 4 miles out of Cairo. Continue to Wickliffe, Ky., Bardwell, Arlington, Clinton, Moscow, Jordan, Union City, Tenn., Troy, Obion, Trimble, Newbern, Dyersburg, Fowkes, Chestnut Bluff, Maury City, Johnson's Grove, Brownsville, Stanton, Mason, Gallaway, Arlington, Ellendale, Bartlett, Raleigh to Memphis.

Vols. 5 and 6 of the Automobile Blue Book, published by the Automobile Blue Book Pub. Co., 910 South Michigan Avenue, Chicago, contain running directions of this trip from Decatur on.

Evolution of Spark Plug Design

No Porcelain Made Impervious to Breakdown—Heat 1350 Deg.

INDIANAPOLIS, Ind., May 26—The evolution of spark plug design from the early days when it was introduced by Cadillac and Winton down to the present day, detailing step by step the developments from the earliest types of internal combustion engines through the processes of manufacture of the modern spark plug and dwelling on the difficulties to be met with in the way of temperature and high-tension current, Albert Champion, president of the Champion Ignition Co., Flint, Mich., addressed the Indiana Section of the Society of Automotive Engineers at the Claypool hotel last night. Mr. Champion voiced the opinion that a virtual carbonizing furnace exists in some of the present-day engines, thus causing a disintegration of the porcelain insulation.

At the close of the talk the matter was discussed by representatives of the Champion Spark Plug Co., of Toledo, and the Rajah company, who were in attendance at the meeting.

Traces Spark Plug History

In tracing the history of the spark plug in this country Mr. Champion mentioned that the first to be made here were those manufactured by Cadillac and Winton, who made them for themselves. The great difficulty in the early days of the spark plug was the breakage of the porcelain. They could not be made to stand up and they also had a pronounced tendency for absorbing oil, which soon rendered them useless, as it destroyed the insulating properties of the porcelain, allowing the high tension current to leak through to the shell.

Insulating materials were next taken up. These are porcelain, steatite, mica and glass. The search for the proper ingredients to enter into the manufacture of the porcelain was explained, and it was shown how these are brought from different parts of the world. The principal ingredients of the porcelain are kaolin, flint, feldspar and ball clay. These must be all brought together and mixed in the proper proportions and then fired at the right heat in the same way that steel must be given the proper heat treatment. Mr. Champion stated that it was not of advantage to secure the highest possible heat, as it is just as possible to overheat the clay as it is to overheat a steel in its heat treatment.

The best porcelain is the one which has the least amount of leakage of electrical current, but there is no porcelain made which has not a point at which it breaks down. It must be remembered that in a

cylinder which is firing with too rich a mixture, a virtual carbonizing furnace exists, and this soon has its effect on the porcelain of the plug. All the porcelains used are what are classified as soft porcelain, and these will absorb both carbon and water. When carbon is absorbed the porcelain is transformed in its molecular formation and the leaking through the insulator increases.

Speaking of steatite, which was used as the insulating material for the Bosch plugs, which are no longer manufactured, Mr. Champion explained that this is a soapstone or talc stone. It has a high dielectric strength, but it is difficult to glaze. The procedure followed in the manufacture of the steatite plugs is to first vitrify and then to use a low-fusing point glaze. It has been found best with this type of insulation not to use a glaze at all, but to rely upon a high polish.

There are two kinds of mica plugs, the wrapped type and the washer. Mr. Champion said that the difficulty with this type is that there is a large percentage of throw-outs, due to the fact that the mica is so easily affected. Even the moisture of the hands, he said, will have its effect on the plug and reduce the ability to hold current. The chief difficulty, he pointed out, is the fact that once the mica absorbs oil it leaks badly. The amount of leakage of a mica plug that is unaffected by dampness or oil is very small.

Glass is bad, according to Mr. Champion, because it is weak mechanically and leaks like the other materials. For this reason it has never been used extensively for spark plugs, although it has been experimented with to a large extent.

Mr. Champion then went into the design of the plug itself. He took up the assembly of the insulator and the central electrode and explained the different methods that are used for cementing the center wire in place, or for clamping it and holding it tight with gaskets, etc. The materials for the central electrodes were also covered, and it was stated that nickel chromium, while good in many respects, is electrolytic, having the tendency of disintegrating under the influence of a heavy current. Some use monel metal for the spark plug wires. This is a copper nickel alloy, being particularly valuable for the relatively small amount of contraction and expansion under changes of temperature. Mr. Champion expressed his liking for the pure nickel.

The discussion on the paper clearly

brought out the difficulties under which the manufacturers of spark plugs are working in order to meet the extreme requirements of dielectric and physical strength under the high temperatures of combustion. For instance, in mentioning the fact that the best of insulators become conductors at very high temperature, Engineer Rody of the Champion Spark Plug Co., Toledo, Ohio, stated that he had made experiments which showed that the temperature reached by the insulator gets as high as 1350 deg. F.

Another point made by Mr. Rody in illustrating the improvements made in domestic porcelains is that in running an engine with spark plugs made three years ago it was found that the plugs could not stand up after the engine reached 1800 r. p. m. This was cited as an example to show that the engines of today are more oily now when running at higher temperatures. This fact was also stated to bear on the observation made by Mr. Champion that the mica plug would be under great difficulty because of the condition that once the mica is filled with oil its insulating qualities are destroyed.

Carburetor Blame Considered

Considerable discussion was also given, which brought out the fact that the carburetor is often blamed for troubles which are inherent in the spark plug. One of these is irregular firing on acceleration, due to the leakage of the high tension current through the insulator, thus tending greatly to weaken the spark.

Gregory Flynn, sales engineer of the Rajah company, pointed out the fact that the manufacturer often did not mount the plugs properly. He said that the engine was first designed and then the question as to where the spark plug could be placed was decided later. He pointed to the lessons derived from racing on this point, and showed how in the racing engine the location of the spark plug is given very careful consideration.

Mr. Flynn mentioned the Delage and Peugeot plug mountings as good examples where no trouble is experienced with the plugs. He compared this with the early Deussenberg engines, where the plug was mounted through a brass cap, which acted as a heat insulator. These engines had continuous plug trouble until the locations were changed. The Cadillac 1913 was mentioned as another example of where the plug had to be changed in order to provide better cooling.

To Aid Motor Transportation

A. A. A. Pledges War Assistance to Government at Annual Meeting

CLEVELAND, Ohio, May 25—The American Automobile Association at its annual meeting in this city today voted to render every possible assistance to the government both in motor transportation and in the sale of Liberty bonds. A motor car transportation committee was appointed. The sale of Liberty bonds will be effected by setting aside a day, probably June 7, which will be known as the A. A. A. Liberty bond day, at which time car owners and dealers throughout the country will devote the day to further the sales of the bond issue. Officers and directors were elected, and numerous other important details discussed and acted upon.

The meeting, which was attended by ninety-one delegates, was opened by Dr. H. F. Rowe, Baltimore, Md., president, who introduced Mayor Davis of Cleveland. The mayor made a short address of welcome. He was followed by Myron T. Herrick, ex-ambassador to France and now a senator from Ohio. Mr. Herrick came to urge the cooperation in the Liberty bond issue, and told of the lack of preparations which allowed this country but one immediate method for aiding the Allies and which he stated was through its great financial power. His address was enthusiastically received and was elaborated upon by George O. Diehl, chairman of the A. A. A. good roads board, who read a letter from the treasury department advocating the Liberty bond day campaign. John C. Wetmore of the N. Y. Evening Mail told of his encouraging experience with the New York dealers whom he induced to sell the bonds, and the delegates then voted to extend the fullest cooperation to the plan.

Reports Are Read

Various reports of the officers were read, and showed considerable roads and touring activities. Dr. Rowe, making his yearly report, told of the work accomplished through the last twelve months, and added that there was much additional to be done, pointing out the existing unjust taxation, the need for national road systems, lack of touring information bureaus, the problem of National parks, and other like matters.

H. A. Bonnell, treasurer, gave his report, which showed that the association has a total sum of \$15,359.94 on hand. Osborne I. Yellott, chairman of the legislative board, reported the completion of a uniform traffic law, and told of the registration of 100,000 car owners who have signified their willingness to extend every aid to the government in the present crisis.

Officers and delegates were elected as follows:

Dr. H. M. Rowe, president; Ralph W. Smith, Colorado, vice-president; P. J. Walker, California, vice-president; D. Jameson, Pennsylvania, vice-president; Royal Scott, Toledo, Ohio, vice-president; A. J. Lupton, Indiana, vice-president; Preston Beldin, Virginia, vice-president; H. A. Bonnell, New Jersey, treasurer; John A. Brooks, Connecticut, secretary; A. G. Batchelder, chairman of the executive committee.

The afternoon program included a discussion by John A. Wilson, former president of the association, in which he told of the government's plans for mobilizing motor cars. He stated that the regulations allowed for companies comprising twenty-seven passenger cars and two roadsters and one truck to each company, and that it would be impossible for companies otherwise formed to receive governmental recognition.

A discussion on how traffic laws can best be emphasized and accelerated was opened by Mr. Yellott, who called attention to his recently formulated uniform traffic regulations. He stated that suggestions on these regulations would be welcomed during this year and would be given thorough consideration so that next spring the laws would be ready for the fullest support of the association.

W. S. Gilbreath, Detroit; A. Fifoot, Connecticut, and P. C. Wolff, Pennsylvania, talked briefly on the subject of marking roads along uniform lines. In the main they agreed that, except for southern California, but little result has been secured as yet in determining some standard system for marking roads.

C. C. Kilbury, Toledo, discussing methods for stamping out car thievery, told of a plan for marking the car serial number and the owner's name in opposite lower corners of the windshield by means of acids. He believes that dealers in glass will cooperate and refuse to sell windshields to any who cannot prove their ownership of the car on which the glass is broken, and that in this way thievery of cars can be reduced.

New members numbering 1,083 and belonging to six new clubs were announced. The membership of the motor transport committee was taken up and resulted in the following membership: Osborne I. Yellott, Indiana, chairman; George C. Diehl, Buffalo, N. Y.; George Kyle, Akron, Ohio; H. C. Clarke, Minnesota; A. H. Eastman, Illinois, and Steadman Bent, Pennsylvania.

The discussion of a meeting place for the next annual convention resulted in the selection of Washington, D. C., and it is likely that it will be of two days' duration.

The A. A. A. has 102,600 members, all of whom will be urged to organize into company units of twenty-seven five-passenger or seven-passenger touring cars, two high-speed roadsters, one light truck and forty men. The companies will be commanded by a carmaster, picked from the ranks, who will have a rating of sergeant of the first class, three assistant carmasters with rank of sergeant, one machinist with rank of sergeant, one helper with rank of corporal, one watchman, ranked as private of the first class, one trumpeter messenger also rated as private of first class, one cook, and twenty-eight drivers with rank as sergeants. Five additional officers will be necessary for the battalion units. The commander will have the rank of major. As fast as the state and club organizations fill their company units they will report to the headquarters of the A. A. A. at Washington, which in turn will report to the government. This plan was arranged by John A. Wilson, a cousin in President Wilson and president of the organization's preparedness committee.

ARRANGE INTERCITY RUN

Cleveland, Ohio, May 25—Following the meeting of the American Automobile Association today, arrangements for the Intercity Reliability Run were discussed and arranged. The schedule is:

First day—Buffalo to Elmira, 189.4 miles with Danville noon control. All of the road on the first day's journey is improved state road except 24.1 miles of dirt road between Danville and Elmira.

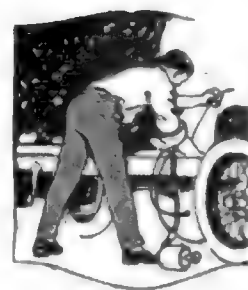
Second day—Elmira to Syracuse, 209.6 miles; Norwich noon control. All of the second day mileage is state road except 21.9 miles, which is divided so that that 11.9 miles will be traveled in the morning and 10 miles in the afternoon.

Third day—Syracuse to Clarence County Club, 173.2 miles; Rochester noon control. This is all state road. Hotel and garage service has been investigated and arranged for. Each contestant will have to provide an observer in a car other than the contestant. There will be brake tests made the day before the run for safety purposes. Fifty entries have been received to date. These include Chicago, ten; Indiana, five; Detroit, ten; New York, ten; Rochester, five; Buffalo, ten.



Electrical Equipment of the Motor Car

By David Penn Moreton & Darwin S. Hatch.



Editor's Note—Herewith is presented the forty-fifth installment of a weekly series of articles begun in MOTOR AGE issue of June 29 designed to give the motorist the knowledge necessary to enable him to care for and repair any and all of the electrical features of his car, no matter what make or model it may be. At the conclusion of this series, "Electrical Equipment of the Motor Car," with additions, will be published in book form by the Class Journal Co., Chicago, in a size to fit the pocket conveniently.

The fundamentals of electrical circuits of the motor car were explained through their analogy to water systems, and the relations of current pressure and resistance were brought out. This was followed by an explanation of series and multiple circuits, how electricity is made to do work in lighting, starting, signalling, etc. Calculating the capacity of a battery for starting and lighting and the cost of charging storage batteries and determining the torque a starting motor must develop were explained. Action of primary batteries and dry cells was considered. A section was devoted to the makeup and action of lead and Edison storage batteries, and another to the care of lead batteries in service and the best methods of charging them. Magnets and electromagnetism then were considered, and the principles of generators and motors explained.

Part XLV—Switches and Protective Devices

A GROUNDED switch is one in which no attempt is made to keep both terminals of the switch insulated from the frame of the car, and in fact one terminal is connected purposely to the switch housing or car frame. A switch of this kind is shown in Fig. 257.

An insulated switch is one in which both terminals of the switch are insulated from the switch housing. A switch of this kind is shown in Fig. 258.

Control and Location of Switches

Switches may be classified conveniently according to the means employed in operating them into the following groups:

Manually operated.

Electrically operated.

Combined manual and electrically operated.

In the case of the manually-operated switch the opening or closing of the switch, or perhaps both operations, are performed by the movement of a lever, pressing a button, pulling or rotating a handle, etc., which is usually within easy reach of the driver of the car. The switch itself may be mounted directly with the controlling handle, button or knob, or it may be mounted in some more advantageous positions so far as the electrical circuit, of which it is a part, is concerned and the operating movement transmitted to it by suitable mechanical connections such as rods, chains and levers. It is especially desirable to locate the starting switch for the motor in such a position that the connecting leads to and from the switch will be as short as possible, and still have

the switch within easy reach of the driver when he is in the driver's seat.

A manually-operated switch which is operated by a rod is shown in Fig. 249. The gear-shifting lever in this case is used in imparting the necessary motion to the rod controlling the switch. An extra position is provided for the gear-shifting lever, and when in this position all the gears are out of mesh and the lever is connected to the rod R, which is connected by the second rod or link L to the lever of the switch. The rod R serves the double purpose of operating the switch and meshing the motor pinion G with the teeth on the edge of the flywheel. When the

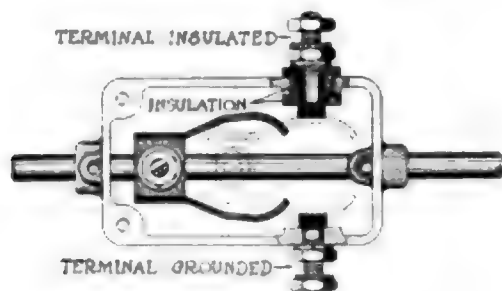


Fig. 257—Grounded switch. One terminal is connected to the switch housing

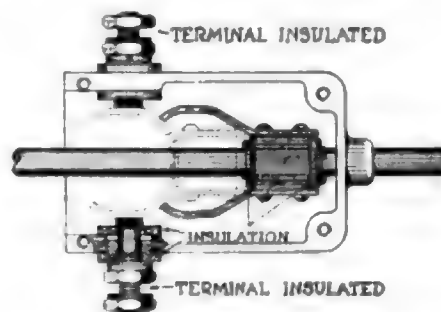


Fig. 258—Insulated switch. Both terminals are insulated from the switch housing



Fig. 249 Starting switch to be mounted directly under the floor board in front



Fig. 153—Schematic diagram of thermionic vacuum tube



Fig. 154—Pin board for test tube in used in test tube circuit

plates is released from the gas-stopping layer is still to be moved to its normal position, due to the action of the spring 15. The gas-stopping action, shown in Fig. 153, is intended to be executed directly under the first flash in time, so within one flash of the plate, but the action is executed on the upper end of a rod which extends through a hole in the base board.

In the case of an electrically operated valve, the movement of the valve is controlled by electromagnets, which may be arranged by placing a small valve within each flash of the driver. This small valve compares the flash from the storage battery through the winding of the electromagnet. The principle of a valve of this kind is shown in Fig. 155. During the plate flash action causes the valve from the grounded side of the battery, which in this case is the positive terminal, through the winding of the electromagnet to the driving circuit and finally back to the negative terminal of the battery.

In some cases the manual and electrical control of valves are combined. A very good example of a valve of this kind is found in the flashlight gun. In this particular case the manual operation of the rotating valve cannot be performed unless a certain electrical operation has been performed previously, which serves to release the valve and permit the manual operation.

Fuse and Circuit Breaker

The primary object of a fuse is to provide a weak spot in an electrical circuit, which will be destroyed when the current in the circuit is allowed to carry beyond designed and safe upper limits, and perhaps prevent serious damage to valuable equipment. The ordinary fuse has made of a piece of wire made from metal having a relatively low melting temperature. This piece of wire is connected in series with the circuit, usually by passing the two wire under the heads of two flat-headed screws. Short wires from the terminals of the plug in the electrical circuit to attach the fuses to be connected. A typical fuse block for test tubes, as well as the theory thereof, is shown in Fig. 156.

In the normal type of fuse the two wires is inserted in a glass or fiber tube and the tube is provided with metal ends, as shown in Fig. 156. Special clips are provided for accommodating fuses



Fig. 155—Schematic diagram of gas valve, handle in open, and gas flow stops



Fig. 156—Schematic diagram of fuse block, handle in open



Fig. 157—Schematic diagram of circuit breaker, handle in open

of this kind, as in Fig. 156, which shows several of these mounted side by side.

The circuit breaker is a protective device which serves to open the electrical circuit in which it is connected without destroying any part of the circuit itself, thus permitting the replacement thereof. The operation of a circuit breaker is used by the driver operator, may be explained by reference to Fig. 157. The circuit breaker breaking mechanism is magnetic pull on its structure, thus creating a current, which creates a pull of current in the main circuit. If the current in the winding of the circuit breaker becomes excessive, due to any reason, such as a ground or short circuit, the magnetic pull is drawn toward the end of the structure, magnet and the magnetic field, which results in the circuit being opened. As time, however, as the current is opened the magnetic pull on the structure causes it to return to its original position, thus closing the circuit again. This type of operation is performed with a magnetic pull and results in a small gap between the two of an ordinary breaker. Thus a circuit in an induction line resulting in wrong with the system, and an investigation should be made.

250 to France Weekly Ambulance Service Volunteers Abroad Are Expected to Reach Thousands

Communities Subscribe for Necessary Expense of Unit

WASHINGTON, D. C., May 25—The American Motor Ambulance Field Service in France is sending on an average of 250 volunteers to France each week, the volunteers being divided into units of twenty-five each. The field service is headed by A. Piatt Andrew, former assistant to the Secretary of the Treasury, who has his headquarters in Paris. Nearly all these volunteers are drawn from the colleges of the country, and each one must be able to drive and repair a motor car.

While expert knowledge is not required some practical experience is essential, and those who volunteer are given several week's practical experience in building Ford cars in some school, garage or factory, before sailing. The service uses Ford cars exclusively in the field.

About 800 such volunteers are now in France, and it is believed that the number which is sailing week after week soon will increase the total to several thousands. The age limit is from 21 to 35 years, and the minimum enlistment is for six months. Each volunteer must pay his own expenses and deposit approximately \$350 before being accepted.

Various communities are furnishing money with which to purchase field ambulances for use in France at the front by units which go from these communities. A unit in France is made up of sixty men with 50 ambulances for each unit.

In St. Louis, for instance, around \$50,000 was raised by citizens to purchase ambulances for the use of the units going from that city, and the unit also was provided with special Pullman cars from St. Louis to New York. It is understood that localities all over the country which have furnished units for this service contributed very generously towards the purchase of service ambulances. Each ambulance costs \$1,600.

BUTLER LEAVES HESS

New York, May 29—Special telegram—Charles S. Butler, for more than six years advertising manager of the Hess-Bright Mfg. Co., Philadelphia, has resigned to become sales manager for the Carlson-Wenstrom Co., Philadelphia, which is shortly to put on the market a high-grade double row ball bearing.

G. M. TO MAKE TRACTORS

New York, May 25—Tractor production on an extensive scale is being planned by the General Motors Corp., which has added the Samson Iron Works, Stockton, Cal.,

turning out about eighteen tractors a week. The new interests plan to enlarge the facilities of the Stockton plant and erect three other similar plants in various sections of the country, which will be ready for operation by the early spring of 1918.

These plants will be located, one in Pontiac, Mich., one near Kansas City, and one at some point on the Atlantic Coast, the location of which is yet to be determined.

By next October, General Motors will be producing fifteen tractors a day. By the time the new plants are finished, tractor production is expected to reach sixty a day. The Samson tractor is known as the sieve wheel tractor, the large drive wheels being of the Webb pattern, which does not pack the ground.

Ministry Accepts Ford

DETROIT, May 25—The English ministry of munitions has adopted in entirety Ford's tractor and is asking all manufacturers concerned to operate loyally in manufacturing the standardized products. Ford's engineers are under the direction of Charles E. Sorensen, who is issuing blueprints to the different manufacturers with instructions to begin work on tractor production immediately. The war agricultural committee recommended the adoption of the Ford tractor after testing it a week continuously, day and night.

CORNELIUS VAN DYK DEAD

Rutherford, N. J., May 24—Francis Cornelius Van Dyk, president of the Rutherford Rubber Co., maker of Sterling tires, died May 21. He was 79 years old and was born at San Juan, Porto Rico. Up to the time of his death he was president of eight land companies and was interested in silk manufacturing. He was president of the South Scranton Throwing Co., vice-president and director of the North Jersey Title Insurance Co., Hackensack, and vice-president and director of the Second National Bank of Paterson for many years.

KENT CALLED A BANKRUPT

Bellville, N. J., May 25—Two involuntary petitions in bankruptcy have been filed again the Kent Motors Co. Both petitions charged insolvency and place the company's liabilities at \$30,000. Both further allege that the concern has committed acts of bankruptcy in that it made preferential payments and disposed of assets within four months of the filing of the petitions. The company was incorporated in September, 1916, with capital stock of \$200,000.

KLEIN RETURNS TO DIRT TRACKS

Detroit, May 25—Arthur Klein will return to the dirt track branch of the racing game. He has entered his name for the races at the Michigan State Fair grounds on Decoration day.

Another War Committee Council of National Defense Selects Automotive Men to Advise

K. W. Zimmerschied to Act as Manager at Washington

WASHINGTON, D. C., May 26—An automotive committee to serve as a co-operative committee under the leadership of Howard E. Coffin, chairman of the committee on munitions of the advisory commission, has been created by the Council of National Defense. It will advise and assist the government departments on all matters involving the use of internal-combustion engines, including the production of motor cars, trucks and ambulances, tractors, motor boats and airplanes. The members are: Chairman, Charles Clifton, president of the National Automobile Chamber of Commerce; C. W. Stiger, president of the Motor and Accessory Manufacturers; Coker F. Clarkson, general manager of the Society of Automotive Engineers; Frank H. Russell, president of the Aircraft Manufacturers' Association; H. L. Horning, chairman tractor standards division of the S.A.E.; Henry B. Sutphen, chairman the marine standards division of the S.A.E.; K. W. Zimmerschied, past chairman standards committee of the S.A.E. Mr. Zimmerschied will act as manager of the committee and will be in charge of its office in Washington.

44.6 M.P.G. RECORD

Detroit, May 28—The mileage-per-gallon test-day held by the Maxwell Motor Co. on May 23, developed some high records. James Lephart, Greenville, Ohio, Maxwell dealer, secured a mileage of 44.6 miles on 1 gal. of gasoline. Other high marks displayed by the reports to the factory are: Moller & Futterer, Quincy, Ill., 40.1; J. L. Alford, Salvisa, Ky., 31.5; J. L. Adams, Rome, Ga., 26.3; Rabbit-Polson Co., Phoenix, Ariz., 35.6; Biever Motor Co., New Haven, Conn., 43.1; R. R. Carroll, 36; George Naipier, Macon, Ga., 44.

KLIESRATH TO LEAVE BOSCH

New York, May 25—V. W. Kliesrath, who has been chief engineer of the Bosch Magneto Co. for many years, and who is as well known in the magneto business as any man in America, has resigned. Mr. Kliesrath has had a very wide experience with the Bosch company, having been directly in charge of the main office and also having control of the engineering and technical department. In addition to handling the motor car end, he has handled the motor boat and aeronautical work as well. At present Mr. Kliesrath has no plans for the future further than a short vacation.



THREE VIEWS OF SLIDE-VALVE ENGINE SHOWING THE VIEW ON THE LEFT SHOWING THE CRANKSHAFT AND CONNECTING RODS ON THE "FRONT" THE CRANK SHAFT TRANSMISSION MECHANISM AND ON THE RIGHT THE CRANKSHAFT AND TRANSMISSION ON THE SIDE OF THE ENGINE

Slide-Valve Engine Properly Lubricated

Auxiliary Oiler Obviates Usual Difficulties

A SLIDE-VALVE engine which has proved itself under rigorous tests at the Illinois Institute of Technology, Chicago, in its capacity of sustaining high speed with perfect lubrication of the slides in the direction of cut has been constructed by E. H. Schiller, Motor Oil Co. The experimental engine with which the test engineer is now in the hands of E. H. Schiller, president of Motor Oil Co., 1100 North York, Chicago.

As the cross-section will show, the slides are actuated by a series of slides mounted on a shaft which is supported by a bearing in the side of the engine. The shaft is driven from the crankshaft which controls in a slight angle in the front of the mechanism from which it is to run from the front.

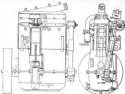
The slides actuate are on the top of the engine, and are thus located directly beneath the bottom of the cylinder. The bottom of the cylinder is supported by a bearing in the side of the engine. The previous objection to the slide-valve engine is that it is not properly lubricated due to its location and design of the slides.

Instead of relying on a common oiler for the lubrication of the slides, a special oiler is provided which consists of a small oiler located in the side of the engine. This is a mechanical oiler and is driven from the crankshaft which controls the movement of the slides. In the case of the slide-valve engine, the oil is supplied to the slides from the crankshaft which controls the movement of the slides. The oil is supplied to the slides from the crankshaft which controls the movement of the slides.

As the cross-section will show, the slides are actuated by a series of slides mounted on a shaft which is supported by a bearing in the side of the engine. The shaft is driven from the crankshaft which controls in a slight angle in the front of the mechanism from which it is to run from the front.

To further insure proper action of the

slide valves they are completely surrounded by cooling water. This is the case in the case of the engine, and is a feature of the design, in a slide valve engine a bearing is not recommended, through the design of the engine the oil is not taken from the engine. The engine was run at high speed for approximately 100 hours, and was found to be in perfect condition.



THIS AND OTHER VIEWS OF SLIDE-VALVE ENGINE SHOWING ACTION OF CRANKSHAFT AND CONNECTING RODS

The Readers' Clearing House

DISCUSSING ABOVE TEMPERATURES By Arthur Holman of Bowling Green, Ohio

FIGURE 1A shows three isotherms for the same mass of substance at P_1 , P_2 and P_3 . The temperature of the substance is T_1 . The temperature of the substance is T_2 . The temperature of the substance is T_3 .

The isotherms show that as the pressure increases, the temperature of the substance increases. The isotherms show that as the pressure increases, the temperature of the substance increases. The isotherms show that as the pressure increases, the temperature of the substance increases.

The isotherms are the isotherms for the substance at the pressure P_1 .

FIGURE 1B is a diagram showing the isotherms for the substance at the pressure P_1 .

FIGURE 1C shows the isotherms for the substance at the pressure P_1 . The isotherms show that as the pressure increases, the temperature of the substance increases.

In practice it is impossible to compare all other substances in the same way. The isotherms for the substance at the pressure P_1 are shown in FIGURE 1A. The isotherms for the substance at the pressure P_2 are shown in FIGURE 1B. The isotherms for the substance at the pressure P_3 are shown in FIGURE 1C.

DATA ABOVE TEMPERATURES Many isotherms shown from these types of data

The isotherms for the substance at the pressure P_1 are shown in FIGURE 1A. The isotherms for the substance at the pressure P_2 are shown in FIGURE 1B. The isotherms for the substance at the pressure P_3 are shown in FIGURE 1C. The isotherms for the substance at the pressure P_4 are shown in FIGURE 1D. The isotherms for the substance at the pressure P_5 are shown in FIGURE 1E.

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The building at the bottom of the page is a factory. The building at the top of the page is a factory.

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Isotherms with the same

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made up, as required to give the driver the maximum use of the steering wheel, and the steering mechanism, which is mounted in the steering column, is connected to the main steering shaft by a shaft.

An ignition switch can be located by simply wiring to a switch in the battery system. However, this has not yet been considered regarding sufficient exposure of the steering column. You will not be able to hold the car in this position, because of the movement of the steering gear, or the steering and lighting control from over the main wheel.

WHEEL POWER IN STEERING MECHANISM

to Road With Apparent Success in Recent Trials

Trials of the new steering mechanism, which is now being tested in the laboratory of the General Motors Corporation, have shown that it is capable of giving the driver the maximum use of the steering wheel, and the steering mechanism, which is mounted in the steering column, is connected to the main steering shaft by a shaft.

It is to be noted that the new steering mechanism is not yet ready for use in the laboratory, but it is being tested in the laboratory of the General Motors Corporation.

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mechanism, it is also necessary to find the place to connect the shaft to the steering column.

In the previous steering mechanism of the automobile, the steering column was connected to the main steering shaft by a shaft.

A steering mechanism system can also be called "steering column" system, because it is the shaft to the main steering shaft. In this system the shaft is connected to a steering column, which is connected to the main steering shaft. It is to be noted that the new steering mechanism is not yet ready for use in the laboratory, but it is being tested in the laboratory of the General Motors Corporation.

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STEERING MECHANISM OF THE NEW CAR

to Road With Apparent Success in Recent Trials

Trials of the new steering mechanism, which is now being tested in the laboratory of the General Motors Corporation, have shown that it is capable of giving the driver the maximum use of the steering wheel, and the steering mechanism, which is mounted in the steering column, is connected to the main steering shaft by a shaft.

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FIG. 1—Buick automobile showing the steering mechanism and the steering column.



FIG. 2—Buick automobile showing the steering mechanism and the steering column. The steering column is connected to the main steering shaft by a shaft.

and tighten them by using two of the nuts as jam nuts. The extra nut should be run down the studs until it is tight against the clutch cover. The rest of the cap screws can be removed then, and as the nuts on the studs are backed away, the tension of the clutch spring will be released gradually, and the cover can be removed.

This operation is to be reversed to re-assemble the clutch.

Recorking the disks necessitates the use of a special cork-inserting tool, and could not be accomplished by the average garage, and it is best to return the disks to the factory service department.

MAGNETS AND LIFTING CAPACITY

Reader Contemplates Making a Recharger for Generator

Antigo, Wis.—Editor *MOTOR AGE*—I am desirous of gaining a little knowledge relative to magnets and their lifting capacity. I have a 40 V. D. C. generator of 15 amp. capacity and am contemplating making a magnet recharger that will recharge magnets sufficiently to give them a lifting power of approximately 15 lb.

1.—What size of wire would be best suited for this machine? How many feet per coil? Which is better and most advisable—the hollow or the solid core type?

2.—What is the formula for determining the lifting power in pounds of magnets? What would be the lifting power of a magnetizer made up of 50 ft. of No. 30 wire? From the

formula amperes = $\frac{\text{volts}}{\text{ohms}}$ and substituting

the above figures, the amperage will be 7.7. Does this mean that the coils will take 7.7 amp. to overcome the resistance before they will start to recharge a magnet? Kindly explain this formula.—O. W. Heck.

You evidently are somewhat confused on the meaning of the terms current, pressure and resistance, as used in connection with the electrical circuit. The term current simply means how much electricity is flowing past a given point in a circuit in one second, just as the current in a pipe means the quantity of water flowing through the pipe in a certain time such as one second. A current of one ampere means there is one coulomb of electricity (the coulomb is the unit of quantity of electricity) passing every point in a circuit each second. The movement of electricity in a wire or electrical circuit meets with a certain opposition just as the movement of water in a pipe. This opposition or hindrance to the free movement of the electricity is called the resistance of the circuit and it is measured in ohms. An

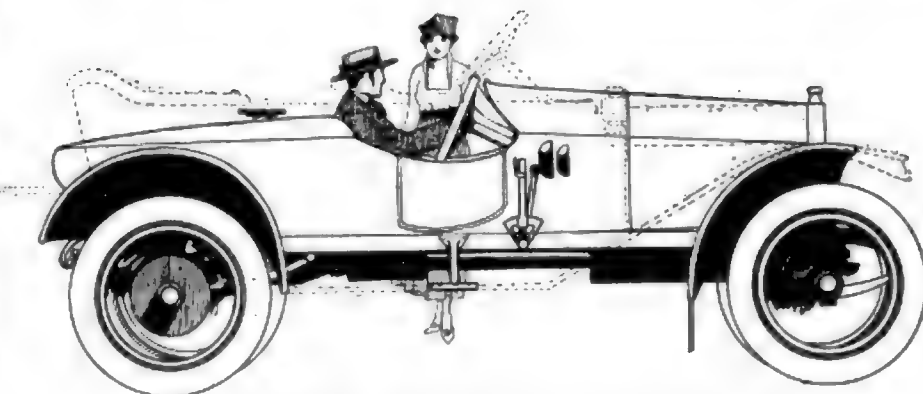


Fig. 4—Speedster body with boat lines on an Auburn 1912 model L-30

electrical pressure is required to overcome the resistance of the circuit and cause the electricity to flow or produce the current and this pressure is measured in volts. The current a certain pressure will produce is equal to the value of the pressure in volts divided by the resistance of the circuit in which the current is to be produced in ohms, or

$$\text{amperes} = \frac{\text{volts}}{\text{ohms}}$$

Now the magnetizing effect produced by an electric current depends upon the form of the circuit in which the current exists. Thus, the magnetizing effect of a current of a certain number of amperes in a straight piece of wire is not very great. If this piece of wire be bent into a coil and the current maintained constant in value the magnetizing effect will be greatly increased. The magnetizing action of a current in a coil similar to those used in the construction of remagnetizers may be determined by the following equation:

Magnetizing action = $1.256 \times N \times I$
In the above equation N stands for the number of turns in the winding and I is the current in the winding in amperes. The magnetizing action, as given by the above equation, is said to be so many Gilberts. This magnetizing action of the current will produce a magnetic field. Every magnetic field is imagined as being composed of imaginary lines called lines of force. Now the total number of these lines of force, called the magnetic flux and measured in

Maxwells, a given magnetizing action will produce depends upon the kind of material in which these lines are to be produced and also the dimensions of the material. The path taken by these lines of force is called the magnetic circuit just as the path in which the electricity flows is called the electrical circuit. In brief, the magnetic flux produced by a certain magnetizing action is equal to the magnetizing action in Gilberts divided by the opposition offered by the magnetic circuit to the establishment of these lines which is measured in Oersteds.

$$\text{Maxwells} = \frac{\text{Gilberts}}{\text{Oersteds}}$$

The reluctance of any part of a magnetic circuit is equal to the length of the part of the magnetic circuit in inches divided by 2.54 times the area in square inches times the permeability of the material. The permeability of any material is equal to its ability to conduct magnetic flux, as compared to air, and it is represented by the symbol μ . The reluctance R is given by the following equation:

$$R = \frac{\text{length in inches}}{2.54 \times \mu \times \text{area in sq. inches}}$$

If the magnetic circuit is composed of several different kinds of materials or several parts of different dimensions, the total reluctance will be equal to the sum of the reluctances of the several parts, just as the total resistance of a circuit is equal to the sum of the resistances of the different parts of the circuit.

The design of a remagnetizer which may be easily changed to meet your individual requirements will be given in *MOTOR AGE* in the near future.

The lifting power of a magnet having both ends in contact with the piece of iron to which the weight is attached, as shown in the figure, may be computed by means of the following equation:

$$\text{Pull in pounds} = \frac{B^2 A \times 2}{11,130,000}$$

B is the number of lines of force per square centimeter at the surfaces in contact.

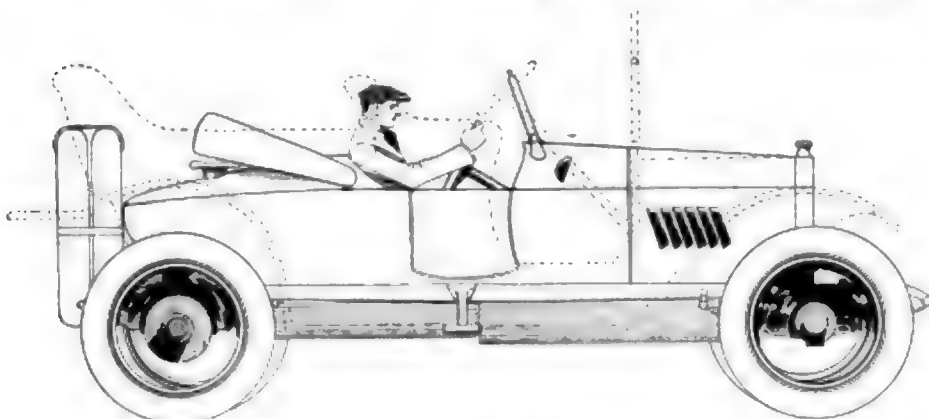


Fig. 5—Boat-type speedster body on model 10 Buick chassis

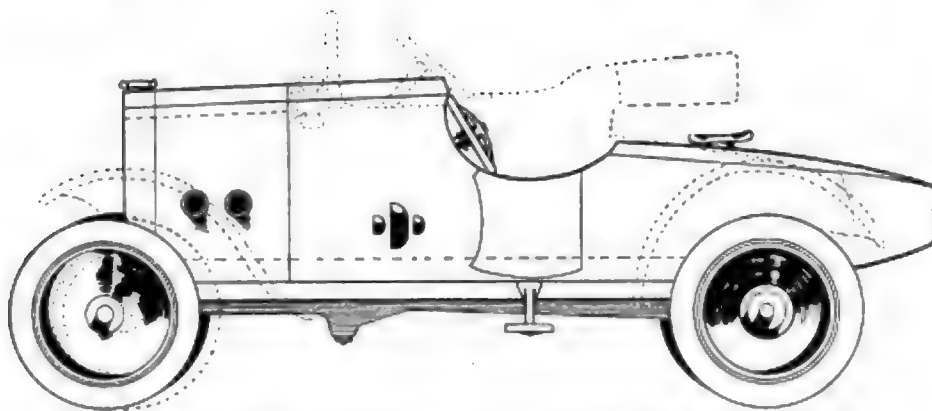


Fig. 6—Special Ford body with unusually large radiator in accord with reader's specifications

A is the combined area of the two contacts in square centimeters.

THE SUPERIOR OF TWO SIZED CARS With All Conditions Considered Ideal Figures Given

Redondo Beach, Cal.—Editor *MOTOR AGE*—Which car would be the best hill climber, an eight-cylinder, 320 in. piston displacement, weight 4500, gear 4½ to 1, or a four-cylinder, 390 in. piston displacement, weight 3500, geared 3½ to 1?—W. W. Niece.

The 390 cu. in. would be superior, considering all other conditions to be ideal in both cases. This is true because with everything else ideal the available torque for hill climbing will vary, as the displacement divided by the weight, with the whole fraction multiplied by the gear ratio. In other words, on the eight-cylinder car the expression for hill climbing ability is 320×4.5

$$\frac{4500}{320 \times 3.25} = 3.67,$$

which is greater than 3.2. This, of course, assumes the same size wheels for both cars.

Auburn Made Speedster

Decatur, Ill.—Editor *MOTOR AGE*—Illustrate a way to convert a 1913 model L 30 Auburn touring car into a speedster, including the fenders.

2—Will a 35 hp. Rutenber engine, 5 in. bore, 4½ in. stroke, fit the 1913 model L 30 chassis fitted at present with 4 in. bore, 4 in. stroke Rutenber engine?—Earl Boose.

1—Shown in Fig. 4.

2—No.

Speedster Body on Chandler

Butte, Mont.—Editor *MOTOR AGE*—Where can I obtain a list of American made cars giving price and address?

2—Show diagram how a model 17 Chandler would look if rebuilt into a speedster.—F. D. Kilgallon.

1—From any issue of *Motor World*, 239 West Thirty-ninth Street, New York.

2—Shown in Fig. 7.

Special Ford Body

Chicago—Editor *MOTOR AGE*—would a radiator 5 in. thick, 14 in. wide and 30 in. high be too heavy for a Ford chassis? I have lowered my frame 4 in. and front axle extended 3 in. to front of frame.

2—Draw a sketch for Ford racing body showing same on chassis with following dimensions: Radiator, 30 in. high, 5 in. thick; hood, 25 in. long; cowl, 25 in. long; end of cowl to be 2 in. higher than radiator. Rear of seat 50 in. from dash; back of seat 20 in. high, and a round sloping tail coming to a pointed edge 8 in. high extending 12 in. fur-

ther than rear wheels. Also estimate what price will be for building same; fenders not to be shown.—J. W. Cargie.

1—Not too heavy. It might, however, be too large, cooling the engine below an efficient temperature point.

2—The illustration is shown in Fig. 6. The work could be done for \$200 or less.

Buick Into Speedster

Detroit, Mich.—Editor *MOTOR AGE*—Furnish suggestions for converting a model 17-10 Buick into a speedster type with top and windshield.

2—What company could furnish me with same and price?

3—Would a center control be advisable?—J. H. Lee.

1—An illustration of a suggested type is shown in Fig. 5.

2—There are several concerns in Detroit making a specialty of rebuilding cars.

3—No. It would not be worth the expense.

Test for Broken Plug

Chadron, Neb.—Editor *MOTOR AGE*—Is there any way to test a spark plug for a broken porcelain when the porcelain is not removable?—Chadron Garage Co.

No direct way. If other tests show that everything else is O. K. it may be taken for granted that the porcelain is at fault.

B. P. M. of Old Marmon

Knoxville, Tenn.—Editor *MOTOR AGE*—What is the r.p.m. of a 1911 Marmon motor at maximum speed and what horsepower?

2—Would aluminum pistons give this motor more speed?

3—What speed ought a 1911 Marmon car make with a cut down body?

4—What ratio gear has it?—F. E. Regnitto.

1—The maximum speed of the 1911 model 32 engine is 2200 r.p.m. at which it develops 55 hp., according to the factory.

2—Yes.

3—There is no means of approximating, so dependent is it on the condition of the car. As this is an old model, its long use may have so deteriorated it that it would not be capable of traveling within 10 or 15 m.p.h. of what it would when new.

4—The standard gear ratio was 3.1 to 1.

Ford Engine on Air Pump

Springview, Neb.—Editor *MOTOR AGE*—I have made an air pump from an old Ford engine, using only two cylinders. I cannot get enough high pressure. How can I arrange it satisfactorily, and at what speed should I run it?—Springview Garage

To get high pressure you would have to fit new pistons with considerably less clearance than the stock pistons, probably .015 to .020 oversize. To these pistons it would be advisable to fit non-leaking rings.

Pistons May Fit Poorly

Sewalls Point, Va.—Editor *MOTOR AGE*—The engine on my 1911 model 65 Rambler pounds very much. When it is picking up I retard the spark, but it does not help any, and after it gains in speed to 15 or more m.p.h. it seems to have a rattling knock. The main and crank bearings seem to be O. K. What is the trouble?—George Smith.

It would be well to look to the fit of the pistons in the cylinders. An engine which has had as much use as yours undoubtedly has, is bound to wear, and it is very probable that the pistons have been worn oval, the cylinders have been worn large, or both things have occurred.

Ford Has Peculiar Jerk

Joy, Ill.—Editor *MOTOR AGE*—My Ford has developed a jerk which is not noticeable when running in low, but jerks when picking up on high. The engine is working fine and the hind wheels are tight. What is the trouble?—L. O. Kistler.

Although your description of the trouble is lacking in detail, it would be our assumption that the difficulty is in the carburetion system. With the present low grade of gasoline your engine will not accelerate quickly when the throttle is opened, taking a few moments for the gas to "catch up" before the engine again settles down to even firing. This is becoming a very common complaint. The remedy is to find a means to heating the gas better, possibly with a hot air attachment, or of taking more time in the process of acceleration.

Ammeter on Genemotor

Greenview, Ill.—Editor *MOTOR AGE*—Have put a genemotor starter and U. S. L. 12-80 storage battery on my 1917 Ford. The starter works fine. I want to put on an ammeter. Advise me where to get one; also how to wire it.

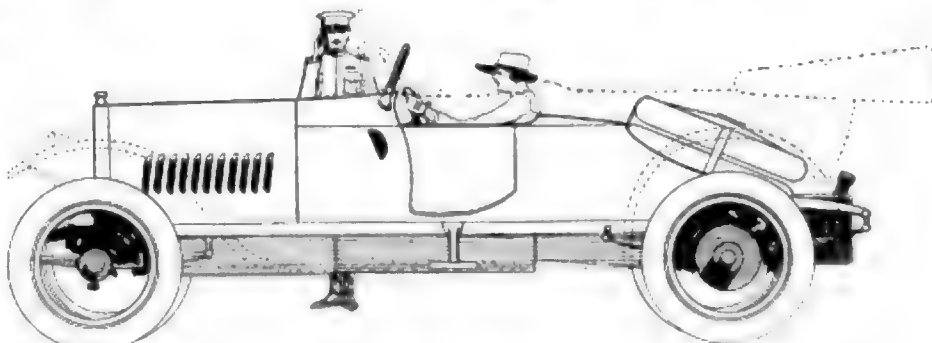


Fig. 7—Ultra-modern speedster body on a 1917 Chandler chassis. There is a lowered-out deck in the rear for extra tires



The Motor Car Repair Shop



Double Door for Tool Compartment

MARTINSVILLE, Va. — Editor **MOTOR AGE**—In the interests of other motorists, I would like to explain a very useful device I made for my Ford car whereby I have my tools handily reached while occupying a space other motorists may not think of. The usual tool box on the running board has to carry so much stuff, that the tool you need necessitates emptying the box to find it.

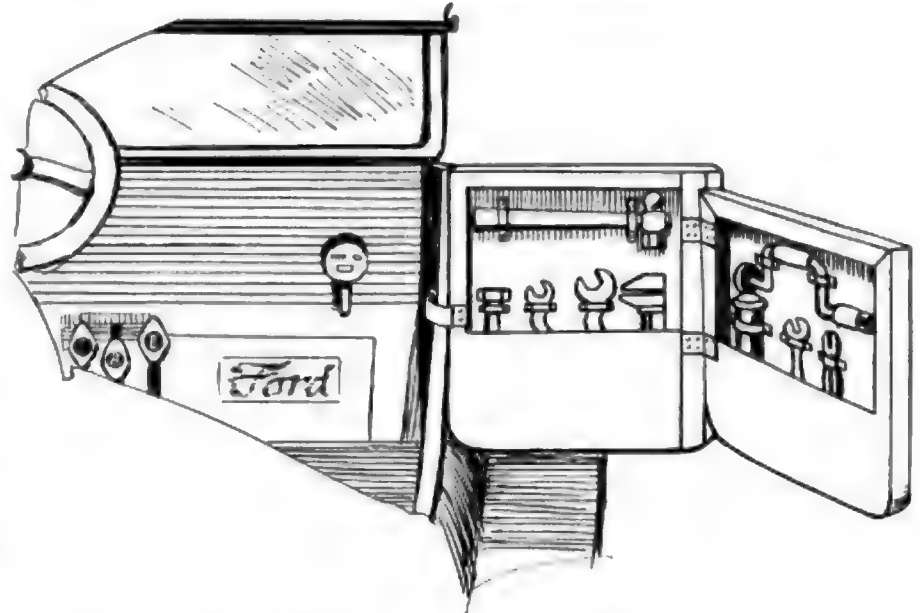
The front door is arranged with a light door of strips of wood properly braced, the hinges screwed to a strip of wood placed up and down behind the metal door lock; the inner door spring catch fits nicely in the notch left by removing the center cross brace next the leather stop. Then a pocket made of canvas or leather in the lower portion of each door with a strap or two to keep the tools in place. Replace the door lining and put new strips of gimp, tacking with black headed tacks as it was before.

It will contain all the tools nicely and would never be noticed unless particular attention was called to it. If desired a lock could easily be used instead of spring catch. The regular tool box can then accommodate spare tubes as well as pump and jack.—George C. Griffith.

Proper Tire Care

The matter of proper tire care is perhaps about the most important consideration of the average motorist, for it is more vital to his pocketbook than anything else in connection with his car. Much is written and more is said about how to get the maximum mileage out of tires, but the views of authorities vary so widely, and the published advice varies so widely that the car owner is often at sea as to just what is the best for his tires. Such statements should be discredited immediately. Tire makers have made an exhaustive study of this pressure matter and their word should be taken as correct. The first and most important tire rule is to pay strict attention to the specified pressures.

Under-inflation is the thing to look out for, not overinflation. If it is found necessary for comfort and protection to carry a lower pressure than is recommended, it may be done, but one must always consider that the life of the tire is being shortened and he cannot blame a damaged casing to temperature, or defects in the casing. If, for any reason, it is imperative that the pressure be less, then the only economical way one can do it is to install oversize tires, tires capable of carrying a great deal more weight than they are taxed for.



A sub-door attached to the front door of a Ford, providing a convenient tool-carrying compartment

One authority states that it is practically impossible to injure tires by over-inflation. This is, of course, speaking of new tires. It does not hold true with old tires weakened by blowouts or long wear. Tires are built with a very high factor of safety, and in tests they have been inflated to as high as 300 lb. per square inch pressure without any harm to the tire.

Of course, there are limits to which the inflation can be carried for comfortable driving, and obviously a tire inflated to too high a pressure defeats the purpose for which it is used. The tire makers have specified pressures which are the best compromise between lack of resilience on one hand and freedom from under-inflation on the other.

It will be interesting to many to know that there is no truth to the statement that tires should be run at a lower pressure in

summer than in cold weather to take care of the greater expansion of air in them and thus prevent undue strains which might cause blowouts. A careful test to see just what the result of hot-weather running is, was conducted and it proved conclusively that there is at the most not over a few pounds pressure increase through driving over hot pavements or roads, and this is really no difference at all so far as the welfare of the tire is concerned.

Dry Cells Renewed

A method of rejuvenating the ordinary dry cell has been discovered by the class in physics directed by Prof. Arthur Smith of the high school at Appleton, Wis. At a cost of 7 or 8 cents an exhausted dry cell is restored to from 50 to 60 per cent of its original activity at full voltage. The tests have been exhaustive and proved in many cases. Dry cells, with zinc unpunctured and retaining about .01 amp. activity, are used. The sides of the zinc cylinder are perforated 3 in. from the base and the cell soaked in distilled water, perforations alone immersed, for 30 hrs. Then they are heated about 10 hrs. and placed in a strong vinegar solution for 48 hrs., sal ammoniac and hydrochloric acid being added to maintain acidity. The cells then are dried at a high temperature and placed in a shallow bath of sal ammoniac and potassium cyanate, and a catalytic agent added. Three hours later the cells show .05 to .06 voltage and 90 per cent of full ampere-hour capacity.

Berling Magneto Line

(Concluded from page 37)

by taking out two screws holding the upper portion of the driving end.

The Berling ED type is similar to the E except that it is a dual design and has in addition a battery interrupter and terminals provided for connection to a combine coil and switch of the dash type. The dual type is particularly adapted for trucks where two sources of ignition supply are desired, and for marine engines where it is difficult to turn the engine over rapidly enough by hand to start on the magneto.



MOTOR AGE

Vol. XXV
No. 12

CHICAGO, JUNE 7, 1917

Price 10 Cents



**36,000
HUDSON
SUPER-SIXES**

*Don't You Wish You Had
Sold Some of Them?*

Hudson dealers have sold \$14,000,000 worth of Super-Sixes since January 1, 1916.

Think what a profit this has meant to them. Think what price they would have been. Because of this tremendous volume of sales Hudson dealers are prosperous. They are the dominant dealers in their communities.

The Hudson is an easy car to sell. No other car in the world—though many make have been made—has equaled what it has done. In the latter makes it hasn't, think and know, no one can mistake its place.

Hudson is always growing. New territories are constantly being created. Hudson demands dependable mechanics with broad repairs and fast re-assembling ability. If you are able kind we want to know you.

HUDSON MOTOR CAR COMPANY
DETROIT, MICHIGAN





*Service Stations to prominently
display only for vehicle speed
meters if car is sold*

Van Sicklen

ELGIN

SPEEDMETERS

Predominant as the only
instruments which indicate
speed-per-hour on a
scientifically correct basis.

*Prices and Specifications
Made on Request*

*The Van Sicklen Company - Elgin, Illinois
Factory - Elgin National Watch Co.*



White
of Auburn, Maine

IN the new White motor, four cylinders accomplish the result of two or three times this number. Performance is even more satisfactory because of greater freedom from complications and is indefinitely maintained as is here by the simplicity and ruggedness of four cylinder construction.

Dealer to Sales Agency



THE WHITE COMPANY
AUBURN, MAINE



Part of the crowd that saw the Chevrolet boys race at Cincinnati and the winner, Louis Chevrolet.

Louis Chevrolet Victor at Cincinnati

By David S. Heath

CINCINNATI, Ohio, June 1.—Louis Chevrolet is a Frenchman against the odds because of this win in the Memorial day race on the Cincinnati track. His speed for the distance averaged 105.55 mph. for the 100 miles, which is only slightly less than the American speedway record made by Old Timeless in a race at Thompson's track in 1919. The time record for 100 miles, 59:40.40, was made by him last year. He was then described by his father, Joe Chevrolet, who followed the winner across the wire by only a hair's breadth over a minute. Louis' brother, Gaston Chevrolet, is a native Frenchman, but he did about after a race and came right for the last 100 miles, was proved that he also had truly American blood from the starting to the end.

For the last 100 miles, Gaston de France, as a Frenchman, did not have the same speed as a Frenchman, but he had the same, averaging better than 100 mph. and was, right with Gaston de France, and the driver, which was shown by the fact that he captured it a week before than his rival in the American race. With the

Win Memorial Day Event in Frontenac at 102.18 M. P. H.—Yall in Hudson, Second and Gaston Chevrolet, Third—Ford Averages 68 M. P. H. for 20 Miles on Board Track

Official Cincinnati Race Times

No.	Car	Driver	100 Miles	20 Miles	Time
1	Chevrolet	Louis Chevrolet	1:05:55.55	1:05.55	105.55
14	Hudson	Ed. Yall	1:07:15.55	1:07.15	107.15
2	Chevrolet	Gaston Chevrolet	1:08:00.00	1:08.00	108.00
7	Chevrolet	Tom Wilson	1:08:00.00	1:08.00	108.00
10	Chevrolet	Edith Brown	1:08:15.55	1:08.15	108.15
8	Hale	Earl Hager	1:08:20.00	1:08.20	108.20
17	Hale	E. H. Williams	1:08:20.00	1:08.20	108.20
16	Hale	Earl Hager	1:08:20.00	1:08.20	108.20
7	Hale	Earl Hager	1:08:20.00	1:08.20	108.20
16	Hale	Earl Hager	1:08:20.00	1:08.20	108.20
17	Hale	Earl Hager	1:08:20.00	1:08.20	108.20

time more than half hour and he was not along like a regular in the track, the Frenchman's record was broken.

There is a large crowd of spectators at the track, and the race was a very successful one, with the Frenchman's record being broken.



James Chevrolet, Chevrolet driver, and Joe Hamilton, engineer.



Joe Vail, second at Cincinnati, in the engineer's seat and Ralph Ballard, sixth at wheel of Hudson.

turned to attention. The conditions of the speed trials require a grid which has been made by drivers each before the motor guards are erected on their tracks.

First Run

Chevrolet's victory was the third event of a series of three to suggest the late American star race. The other two included a Ford endurance event for its new model, was won by J. B. Harman of Cincinnati. There were twelve starters in this test, all of them French, and several think that the Ford demonstrated again. It is worthy of note that the first four places were taken by the American-made Hudson. Chevrolet's race for the silver was 10 miles, 44.1 mi., an average of 10.11 m.p.h., which is going well for a Ford.

The second event on the track was a five-mile, one mile, quarter-mile event for the Chevrolet-Buick type. It was open to all race machines of displacement, but no driver of one entered in the big stream—the competitors—must appear. This was for a distance of 10 miles and the first by a Hudson to a Hudson Buick, the at a speed of 10.11 m.p.h. The crowd probably would have been considerably higher had Ballard's friend in company to stay in the Hudson, but in the field of the machine, there was only one other offered any competition. This was a Ford driven by Joe Hamilton who remained in the racing

about after a series of several years. Chevrolet's class was the only driver for the distance then that of the winner, the Ford carrying 10.11 m.p.h. At this, Ballard was the driver of the race of the field.

Being that was better in days may tell the story that in the Cincinnati event, each one of the three races was won by car No. 1.

There was an exceptionally good crowd, even, watching in the neighborhood of 10,000 people of steady race interest kept previously and steady there on the day of the race. It was generally that the last, first and parking space were crowded

still more in a greater extent than usually for such a race.

The crowd was quite was characteristic and representative of Cincinnati as usual, there is little evidence of loss of popular interest in sporting events. The crowd was in the line for the Hudson-Buick de France and Louis Chevrolet for five, and James Chevrolet and Vail for second. It seemed to them as a popular favorite and was given out there for the estimate for sale of the Ford's chances of winning.

Another of the spectators' most big game drive in the crowd as being the intensest action taking in the excitement of spectators. There were few accidents, it is true, during the track-right, starting, but as the race began, the engineer's Buick overtook and played up the field when a few more took their own race and not successful. Chevrolet's special might be in the last round and second lap, making a great start during the Hudson's lap, particularly when 7 miles after it began this, the position race registered in a column of three. The driver and the engine caught in jumping. And there, during the late speed, disappointed

Chevrolet, the Winner

Joe Chevrolet, who was the Chevrolet race, in a series to enter motor. He is of French birth and was the first to win the three races. His last race was a 10-mile race for the Hudson-Buick when he won in the prize. In 1916 Chevrolet was placed by Hudson to get the Buick race on the engine racing and there showed up the engine first year, winning the race trophy. Chevrolet's name is James Vail at that time. His last victory was the Hudson-Buick race at Cincinnati, Pa., last year. Chevrolet made his own racing team, the Chevrolet-Buick team.



James Chevrolet, who finished third with the Hudson-Buick, a duplicate of the model of the Hudson-Buick.



A break in the race at Sheshaug Bay race. Louis Chevrolet leading in Fabian-Bowling Vaux-Horsepower

himself by slowing up to throw a few magazines in the fire lighters.

James Chevrolet ran the race consistent even for the entire 100 miles, never making a stop and the 100,000 gallons of the gasoline given divided among the two first winners, was well earned.

The Chevrolet finished almost good talk track, having kept very close to Scott all the way. In fact came up a long way from the end to the second position and placed the Fabian like a general.

The Race in Detail

The grandstands were estimated by other visitors to various estimates, some estimates indicating nothing more than the track and the field. They gave an illustration of how thousands of fans gave home are crowded to the limit. The race started at 11 A. M. and Scott and Louis won. They provided great entertainment by driving faster, which is exciting, colored red, white and blue parades supporting American flag.

When the race started, there was about the first lap after their preliminary starting lap, they were racing in the following order: Fab, Joe Thomas, in a Buick special, second, Mike Brown, Chevrolet, third, Ralph de Fabian, Paul and. At the end of the lap, de Fabian had dropped to the back, followed by Thomas. In the next lap, de Fabian was still leading, but Louis Chevrolet in a Chevrolet had passed de Fabian.

Scott, in the Fabian, was the first to stop at the pit, coming in on the tenth mile. In another two miles, Thomas came in for the first of his seven stops, and then that is all and again.

At the end of the first 10 miles, de Fabian was leading in a spirit of their fight. Thomas was found to check the bridge into a house near before it was back home around.

At the twentieth mile de Fabian was lead-

ing the procession, with Louis Chevrolet a short second and Thomas, in a Buick special, third. At 30 miles, de Fabian was averaging 100 m.p.h. Chevrolet took the lead at 40 miles with de Fabian second, the speed having dropped to 90 m.p.h. At 50 miles the order was the same with Chevrolet being faster than 100 m.p.h.

Scott was passing de Fabian way down the second and passed him shortly after. At the thirty point, the two Chevrolet brothers were leading the field at 100 m.p.h. de Fabian again passed the lead at the 40th mile with Louis Chevrolet a short second. The time was below five 10 m.p.h. de Fabian had lost had lost 100 miles had been covered, when he retired. This left the two Chevrolet brothers as the front-runners at 100 m.p.h. miles.

During this time there had been a number of retirements from the race, one of them being the second change driver for de Fabian, who retired with a cracked cylinder.

At about 60 miles, James Chevrolet took the lead, to be shortly passed by Paul de Scott of the procession. At the end of 80 miles, however, James had taken the

lead again from Paul and Louis Chevrolet had also passed the Fabian, so that the two brothers were making a team of it in the last and second, change to second order. Thomas, however, showed up in the pits and his number showed the way for the rest of the Fabian.

James Chevrolet had almost got out of the race at the 100th mile when a road crew off the track ran and stopped around the leader alone. The car whirled around and stopped into the road in a race and the Fabian plan was broken. James showed down of the pit knowing that he would have to change tires, but at the time he could not, he was signaled to keep going.

Paul showed up at the pit at the same time James Chevrolet came in, but just this time and passed James for second to the last 10 miles. The time at 100 miles was very close, only a minute and two seconds separating first and second, but less than a minute between second and third.

Behind the line of the speed car, showing away during the last 10 miles of the race, had left the track in the tenth, starting down at the Sheshaug Bay.

There were three of the Chevrolet boys at the race. Louis was the winner, in the Fabian. James Chevrolet is married and he kept him from the progress of the business. In order their race of age. The third Chevrolet was shown by McQuarrie, who took the place of Joe Scott. At the young Chevrolet's entrance was to leading the Chevrolet. Never was lost in a race on condition of Scott and track.

McQuarrie Called by Ray

Ray has placed in his hand on leading with no more than Mike McQuarrie, who was intended to drive the Fabian Special, was forced to give up the wheel to James McQuarrie who called to Washington to improve government lead-



Jimmy McQuarrie who won the First Fabian in a Chevrolet Special.

31 Entries for June 16

Pilots Begin Warming Up Mounts at Chicago Speedway for Third Meet

25 Per Cent of Gross Receipts to Be Given for War

CHICAGO, June 5—Twelve of the thirty-one cars entered for the annual racing derby on the Chicago speedway are now at the track and the others are either in the local freight yards or due to arrive to-day or to-morrow. At a meeting last night officials of the race were designated and final arrangements for the 250-mile dash made. C. H. Foster, president of the Speedway Country Club, will referee the main event. Fred J. Wagner will occupy his usual position as starter with Thomas J. Hay as assistant. Harry Nipper will handle the timing.

Tommy Milton, one of the three Duesenberg pilots, qualifies as the early bird, having been the first to try out his mount this year on the local board oval. The entries to date follow:

Driver	Car
Hudson	Mulford
Hudson	Patterson
Hudson	Vail
Hudson	Gable
Newman-Stutz	Taylor
Omar Special	Toft
Stutz	Cooper
Mercer	Haines
Mercer	Thomas
Mercer	Unnamed
Frontenac	L. Chevrolet
Frontenac	G. Chevrolet
Frontenac	Boyer
Crawford	Ewan
Crawford	Britt
Olsen Special	McBride
Olsen Special	Unnamed
Ogren	Mason
Ogren	Henning
Unnamed	Oldfield
Hoskins	Lewis
Pan-American	Alley
Duesenberg	Milton
Duesenberg	Hoarne
Duesenberg	Detrich
Packard	de Palma
Ostewig Special	Ostewig
Mercedes	Fontaine
Detroit Special	Buzane
Delago	Locain
Delago	Devigne

Another entry is practically certain, that of Andy Burt in an Erbs Special, which will bring the list up to thirty-two, the limit under A. A. A. rule for 2-mile tracks. Eliminations will be run off Thursday, June 14.

Seven entries have been received for the amateurs' race that will be the curtain raiser. These include four Mercers, one

Locomobile, one Haynes and one Peerless. This will be a 100-mile event, and Charles Stiger will referee.

Oldfield's new car has been shipped from the Pacific coast, and if it takes to the course as Barney feels it should he will pilot it June 16, turning his Delage over to Cliff Durant.

There will be some university track events prior to the motor races. There has been some question as to the exact amount or percentage of the gate that is to be given for war use. At first it was intended to give a percentage of the net, but it has finally been agreed that 25 per cent of the gross receipts will be given toward defeating Mars grind against the world.

BARBER WINS AT WASHINGTON

Washington, D. C., June 1—Irving G. Barber and his car, the Beaver Bullet, carried off the lion's share of the prize money at the race's Decoration Day, finishing first in the four events for which his car was eligible. The races were under the sanction of the A.A.A. and consisted of five events, the 5-mile for non-stock cars of 300 cu. in. and under, won by the Kline car driven by M. Kriner; the 5-mile non-stock for cars of 301 to 450 cu. in.; the 10-mile non-stock, free for all, won by Barber; the 5-mile non-stock handicap, free for all, won by Barber, and the 20-mile non-stock, free for all, won by Barber.

CHEVROLET SETS RECORD

Eugene, Ore., June 2—Bill Wallace of Portland, accompanied by C. M. Steves of Oakland, Cal., defeated the Shasta Limited in a race from Portland to Eugene recently, in which Wallace was driving a stock Chevrolet four-ninety. The train's time was 3 hr., 51 min., while the car made the 132 miles in 3 hr., 49 min. The previous car record was 4 hr., 20 min., 10 sec.

FORD PLANS APPROVED

Detroit, June 4—William Livingstone, president of the Dime Savings Bank and for many years president of the Lake Carriers' Association, testified to-day in the trial of the Dodge-Ford suit and told how he had for the last two years assisted Henry Ford in perfecting plans for the improvement of the River Rouge where the Ford blast and tractor plant are to be built. He stated that the government's engineers, the secretary of war and the congressional committees favored the plan. This plan of shipping directly from the Ford company's own docks on the Rouge had been cited by the Dodge brothers as evidence of the impractical character of Henry Ford's ideas.

Mr. Livingstone said, "I consider that the site chosen for the Ford smelter was very wisely chosen and that the proposed development of the Rouge is feasible, practicable and economical."

Chicago Is Motor Depot

Army to Buy Cars and Trucks Through Mid West Headquarters

Makers Are Asked to Submit Bids and State Delivery

CHICAGO, June 4—All motor vehicle equipment for the Army is to be purchased through the Chicago depot of the Quartermaster's Corps. Colonel A. D. Kniskern at the headquarters of the central department in Chicago is in charge of this work, and the first bids, as mentioned in Motor Age two weeks ago, are to be opened June 8, others June 10 and still others June 11, Sunday. Manufacturers of motor trucks have been requested to submit bids on trucks according to the Army specifications, but it is understood from sources close to Quartermaster's headquarters that truck manufacturers should bid on their own specifications where they cannot comply with the standard government specifications.

Truck manufacturers should specify make of their units, such as motors, gear-set, axle, etc., and most important, should state definitely just how many vehicles they are in a position to deliver per year and per day and the quantity and date of earliest possible deliveries, without jeopardizing the commercial trade.

Classification of bids will take some time, and the date of the ultimate awards is yet to be decided upon.

LARGER WOODS AT \$2,950

New York, June 5—Special telegram—The Woods Motor Vehicle Co. is making deliveries of an enlarged model of its dual-power car. Only one model, a four-passenger coupe, selling at \$2,950, will be made. The essential changes are the use of a 2½ by 4 cylinder Continental engine and the lengthening of the wheelbase to 124 in. The tires have been enlarged to 35 by 4½. The electrical elements are identical with those of the previous model.

TWIN CITIES RUSH TRUCKS

Minneapolis, Minn., June 2—War is accelerating the truck business in the Twin Cities. The E. G. Staude Truck Mfg. Co. has just completed a rush order amounting to \$85,000, sent by express to be delivered in London. All 120 employees turned in and in 29 hours' continuous work had packed 500 Mak A-Tractors, on which the express charges to the Atlantic seaboard were more than \$9,000. A steamship was held at port for the order.

Since Jan. 1 more than \$3,000,000 worth of tractors have been sent out for the Allied forces, or 1000 machines. Emerson-Brantingham Co. shipped 300 to France, Russia and England and has contracts for

as many more. Gray Tractor Co. has shipped 150 tractors, and orders still are unfilled. The Bull Tractor Co. has sent out 250 machines and is making continuous shipments to England.

Six G-M-C motor ambulances have been sold by B. E. Fawkes, distributor, to Minneapolis citizens, three for the local base unit hospital and three for the Norton-Harjes corps. Each car has a special body and costs \$1,805.

MORRIS BANK ORGANIZED

Detroit, June 4—The Industrial Morris Plan Bank of Detroit has been organized to extend loans to motor car and other workers in this city. Edwin S. George, president of the Steel King Motor Plow Co., is president, and Eugene W. Lewis, vice-president of the Detroit Axle Co., is vice-president. Car makers were instrumental in organizing this bank, the purpose of which is to eliminate the evils of the loan charge as regards motor car workers.

MAKERS BUY LIBERTY BONDS

Detroit, June 1—Detroit manufacturers assembled at the board of commerce last night subscribed to millions of dollars' worth of Liberty Bonds. The Ford Motor Co. was the first and largest subscriber, taking \$1,250,000 worth of bonds for its employees. The Cadillac Motor Car Co., the Detroit Copper & Brass Rolling Mills and the Maxwell Motor Co. each subscribed for \$250,000 worth. The Continental Motors Corp., Detroit Steel Products Co., Timkin-Detroit Axle Co., Chalmers Motor Co. and the Fisher Body Corp. each subscribed to \$100,000. Subscriptions of \$50,000 were made by the Hayes Mfg. Co., the Edmunds & Jones Co., the Russell Wheel & Foundry Co., General Aluminum Brass Mfg. Co.

LIBERTY BONDS FOR SALES

Detroit, June 2—The Packard Motor Car Co. has started a Liberty Bond race which will last until June 15. Prizes will be given as follows: For three sales, of new Twin Sixes exclusively, two \$50 Liberty bonds; for four sales, three bonds; for five sales, four bonds; for six sales, five bonds; for seven sales, six bonds; and for eight sales, seven bonds.

LIBERTY BONDS FOR PRIZES

Detroit, June 4—The Maxwell Motor Car Co., Inc., will give \$50,000 in United States Liberty Bonds to owners and dealers in a 1-gal. gasoline economy test to be held June 16 to 25. The company expects an entry list of 40,000 cars.

MUTUAL ENCOURAGES BOND ISSUE

New York, June 1—Marion-Handley cars may be bought with Liberty Bonds. The Mutual Motors Co. has arranged to cash these bonds at \$110 as payment for every \$100 paid for the car.

Indict Emerson Officials

Grand Jury Holds Fourteen Men on Charge of Conspiring to Defraud

Stock Jobbing in Promotion Alleged After Receiver Is Appointed

NEW YORK, June 5—One hour after a receiver in bankruptcy had been appointed to-day for the Emerson Motors Co., fourteen men connected with the company and its stock promotion were indicted by the Federal grand jury on a charge of conspiring to use the mails to defraud the public. The charges cover eighty-five typewritten pages and in substance allege that the company sold its stock on representations which it did not intend to carry out. The allegations are similar in substance and tone to those made by the petitioners in bankruptcy whose claims are set forth below.

Those indicted are: Theodore A. Campbell, president; Robert Craig Hupp, former vice-president and general manager; George N. Campbell, treasurer; George B. Gifford, Nicols Field Wilson, Willis George Emerson, Henry B. Humphrey, William A. Morgan, Osborne E. Chaney, Frank Sturkens, William Loomis, Bron R. Riess, William H. Stetson and Robert P. Matches. The companies involved are Emerson Motors Co., manufacturer, C. R. Berry and Co., and Robert P. Matches and Co., brokers, H. B. Humphrey Co., Boston advertising agent.

Bail Was Furnished

Bail was fixed at from \$2,500 to \$10,000 for the various men and was readily furnished. The receiver in the bankruptcy action states that he has sent two men to the company's plant in Kingston but has as yet secured little information as to the status of the business.

The receiver was named at the request of three stockholders whose names and claims aggregate \$9,000. The allegations of the three stockholders are voluminous. They charge that the company incorporated under the laws of Delaware for \$10,000,000, \$3,000,000 common and \$7,000,000 preferred, was originated as a stock-jobbing company for getting the money of an unsuspecting public. It is further claimed that the assets do not exceed \$100,000 and that the liabilities are far in excess of \$500,000 of the stock, which was so widely advertised, it is charged that \$2,700,000 of it, \$10 par value, was sold to Nicholas F. Wilson for underwriting, on his promissory note for \$470,000 and Emerson, Hupp, Campbell and others.

The Emerson Motors Co. made its first appearance in the middle of 1916. In October, 1916, it was announced that the plant of the Peckham Railway Car Truck Co., in Kingston, N. Y., had been secured and that the production schedule

called for 30,000 cars in 1917. The latter part of October, 1916, an investigation of the Emerson plant showed that manufacture seemed really under way. In March of this year the company, according to investigation, was building five cars a day and had shipped quite a few cars. While the project did not measure up to some of the big production ideas regarding the company it nevertheless was proceeding with manufacture.

MAJOR MARMON NOW

Washington, D. C., June 5—Special telegram—Howard Marmon has been appointed a major in the signal corps, U. S. A., in charge of aircraft engines. His appointment as captain was announced last week in MOTOR AGE.

ST. LOUIS THIEVES CAUGHT

St. Louis, Mo., June 1—Last week was a disastrous one for motor car thieves here. Thirty-two machines were recovered from one gang to which more than 100 successful thefts have been traced. Eleven persons were arrested, including Charles Beecher, a Springfield, Ill., garage owner, through whose place the cars were sold. Two women were members of the gang. The plan was for an expert to visit St. Louis and Chicago and point out to employed chauffeurs the cars he would sell and these would be stolen. In the garage used here, equipment for removing engine numbers and many duplicate parts and equipment for the makes of cars usually stolen were found. Late in the week a policeman shot and killed a thief driving a stolen car. A few weeks ago a local garage owner named Ebbeler was arrested. His plan was to take orders from country dealers for certain makes of used cars at a specified price, then arrange for stealing a car of that value.

N. A. A. J. TO GIVE AMBULANCE

Excelsior Springs, Mo., June 1—Directors of the National Association of Automobile Accessory Jobbers at a three-day meeting ended here today authorized the purchase of \$10,000 worth of Liberty bonds and an ambulance, together with an amount sufficient to provide a field man for its operation for one year, the ambulance to bear the name of the organization. An investigation is to be made to ascertain that whatever is purchased will be of practical value and put into immediate use in Europe.

Fourteen jobbers were elected to membership and six manufacturers to associate membership.

Financial reports showed a net balance in the treasury of \$34,652.59. The collection department has received 22,483 claims, totaling \$120,674, of which 49 per cent have been collected.

The next meeting will be late in August or early in September.



EDITORIAL PERSPECTIVES



No Classes in War

READERS of MOTOR AGE may wonder why so much space in a motoring publication is devoted to purely war subjects. They may wonder that in a periodical devoted solely to the interests of motors, a page is given each week to a subject as seemingly foreign to its particular field as the Liberty Loan or the wastage of guns in the European battle fronts. These things are not foreign to motorists or their interests. In war time every object must be subordinated to that of war. We must fight—each one of us—whether we be called to the front or not. Frank Scott, chairman of the munitions board of the Council of National Defense who is quoted on another page, made the statement that "war has become the most complex of all sciences."

WE are using in the conduct of modern war practically every known science and every form of engineering. We began years ago with the civil engineer, the military engineer, the man who was the architect of the castle, and incidentally introduced into its frame those things that made it strong against attack. To-day we use the civil engineer, the mining engineer, the metallurgical engineer, the automotive engineer, chemistry in all its forms, the science of acoustics, the electrical engineer, every form of surgery, everything known to the physician, everything known to the pharmacist and everything known to the optician, until it seems that there is nothing left in the world that has not been called upon to make its contribution to this business of determining who shall be the victor. From now until the time when we can say honorably that we are at peace we must emphasize the fact that

WE ARE AT WAR

SOMEBODY has said that in peace nothing so becomes a man as modesty and humility, but when the blast of war sounds in our ears, then we must imitate the action of the tiger. Now that we are at war, now that we have at last entered this conflict to do our part in determining what shall rule the world and what kind of ideas men shall bend to from this time forward, it rests upon us to imitate the action of the tiger, and we must put into this effort every ounce of endeavor that this country can put into it until we can say honorably that peace is ours, and that the conditions of peace which are to be imposed shall be our conditions and not those dictated by our enemies.

CHAIRMAN SCOTT on another page gives some conception of the demand for ammunition and guns in modern warfare. You can apply that to production from the raw material up to the finished article. The projectile of the Civil War period was a very simple projectile, made of cast iron and with very few machine operations on it. Many of them had no machine operations at all. Today, if you take the shrapnel forging, it has—just on the forging, before you have loaded it, and without the fuse—fifty-three machine operations; and you are going to fire away twenty to twenty-six of those in a minute. And that is the simplest part of the shrapnel except the brass case. That is the reason for a munitions minister in France, in England, the reason for a munitions board in the United States, and the reason why we may have eventually an even more centralized form of control over our purchasing and manufacturing. For this reason we must realize

WE ARE AT WAR

Make License Number Perpetual

A LICENSE number on a motor car serves several purposes but it is not put to its greatest use and will not be until it becomes perpetual and is made as much a part of the car as is the engine or the rear axle. So much is heard about prevention of car thefts that it is peculiar some action has not been taken to make the license number put fear into the heart of the car thief by making the license plate perpetual and one number serving one car and one car only during the life of a car.

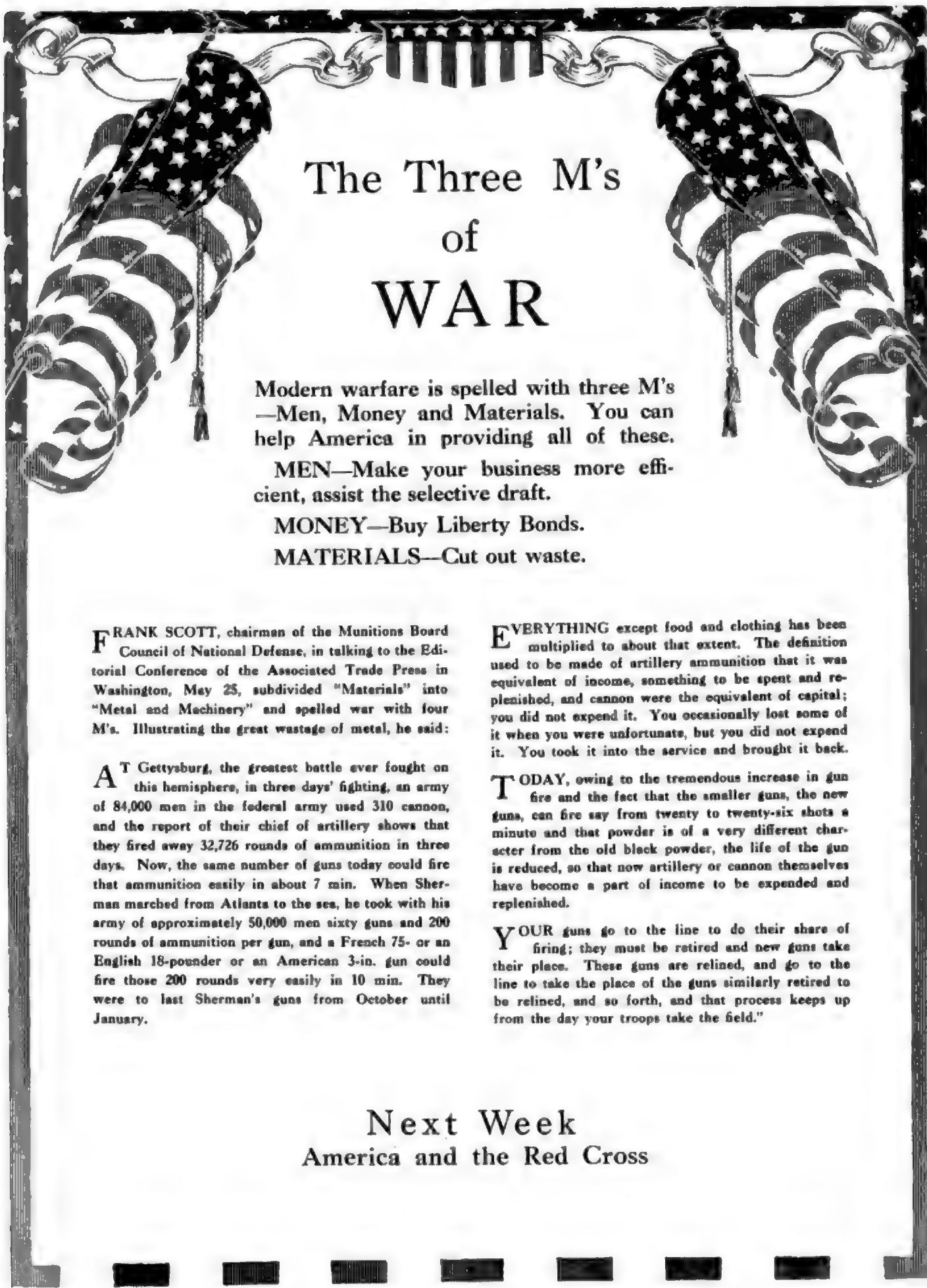
SOME of the advantages of a perpetual number plate are this: It would prevent the changing of license numbers because there would be no necessity for change except when a license plate was lost and then the applicant would have to prove ownership before he could get a duplicate. A new car would be given a number and would carry it indefinitely. If some color identification for the year was thought advisable then a small tag that would carry the year and state abbreviation could be turned over to the car owner each year when he paid his license fee, but he would retain the same number.

ABSENCE of a license tag would be reason enough for an officer to demand that the car operator show his ownership. A person could not obtain a license for any but a new car once the plan was put into effect and all cars numbered.

He would have to give rather detailed information on his car to get a license and there should be a department in each county seat to handle the licensing of cars. A car thief would find it impossible to steal a car, secrete it and apply for a new tag, for his only excuse would be that he had lost his tag and the only number he could get for that car would be a duplicate. An owner losing a car would report the loss and his license number. Any attempt to get a duplicate number would mark the thief.

EACH state could effect a material saving in the manufacture or purchase of tags. With the perpetual-number license plate, the year and state part of the tag could be turned out very cheaply, as all of these would be alike instead of each tag requiring a different number when manufactured. The license fee could be the same each year and by making the year and state plate of a different color each year check would be easy on those who had and had not paid their tax.

THIS plan of licensing would make much more simple the mechanics of registration, thereby directing that much more of the license fees to road work. Records would be simpler, and given a car to prove the ownership, as already stated, no tag but a duplicate could retain the car.



The Three M's of WAR

Modern warfare is spelled with three M's—Men, Money and Materials. You can help America in providing all of these.

MEN—Make your business more efficient, assist the selective draft.

MONEY—Buy Liberty Bonds.

MATERIALS—Cut out waste.

FRANK SCOTT, chairman of the Munitions Board Council of National Defense, in talking to the Editorial Conference of the Associated Trade Press in Washington, May 25, subdivided "Materials" into "Metal and Machinery" and spelled war with four M's. Illustrating the great wastage of metal, he said:

AT Gettysburg, the greatest battle ever fought on this hemisphere, in three days' fighting, an army of 84,000 men in the federal army used 310 cannon, and the report of their chief of artillery shows that they fired away 32,726 rounds of ammunition in three days. Now, the same number of guns today could fire that ammunition easily in about 7 min. When Sherman marched from Atlanta to the sea, he took with his army of approximately 50,000 men sixty guns and 200 rounds of ammunition per gun, and a French 75- or an English 18-pounder or an American 3-in. gun could fire those 200 rounds very easily in 10 min. They were to last Sherman's guns from October until January.

EVERYTHING except food and clothing has been multiplied to about that extent. The definition used to be made of artillery ammunition that it was equivalent of income, something to be spent and replenished, and cannon were the equivalent of capital; you did not expend it. You occasionally lost some of it when you were unfortunate, but you did not expend it. You took it into the service and brought it back.

TODAY, owing to the tremendous increase in gun fire and the fact that the smaller guns, the new guns, can fire say from twenty to twenty-six shots a minute and that powder is of a very different character from the old black powder, the life of the gun is reduced, so that now artillery or cannon themselves have become a part of income to be expended and replenished.

YOUR guns go to the line to do their share of firing; they must be retired and new guns take their place. These guns are relined, and go to the line to take the place of the guns similarly retired to be relined, and so forth, and that process keeps up from the day your troops take the field."

Next Week America and the Red Cross

HELP Win the War

IT is all right to ask for volunteers, but if we are not going to be able to feed them and clothe them and equip them, we might as well send them home today. There is no use in passing the conscription bill to get 500,000 young men to go out of this country if you cannot feed them when you get them across France."—Louis B. Franklin, of the United States Treasury Department.

WE MUST HAVE MONEY FIRST—therefore, subscription to the Liberty loan is the patriotic American's first duty. If we do not raise the money to finance our armies, our navies and our allies, there will be little business left in this country—we are liable to be defeated in the world warfare. It is to the salvation of business that this war shall be carried through to a successful conclusion at the earliest possible moment.

EVERY month saved on the duration of the war is business piled on heap upon heap for the future. Every month the war is prolonged means destruction of resources and stalling of business. Every cent of the Liberty loan will be spent right here in America. We are lending money to our allies but it is not going out of the country—that money is going into our industries. Liberty bonds may be cashed in at any time—the chances are that they will be worth more than they cost.

BUY A BOND



Motorizes Artillery Unit

U. S. to Free Horse From Work of Dragging Medium Caliber Gun

Experiments Indicate Machines Can Handle Most Ordnance

WASHINGTON, D. C., June 1—What is believed to be the first complete unit of horseless artillery in the world has been created through the development of a fully motorized field battery of medium caliber guns by the United States. Both European and American engineers worked on the problem of eliminating the horse entirely from the work of dragging such guns to the front for years before the outbreak of the great war. Successful experiments by the Government now seem to promise an early substitution of the machine for the horse in handling nearly all forms of ordnance.

Experiments were first made with various types of tractors under the direction of the Field Artillery Board at Fort Sill, Okla., and by the Ordnance Department of the Army at the Rock Island arsenal, followed later at Fort Bliss, Tex., with a completely equipped battery. The tractor standards committee of the Society of Automotive Engineers has been actively co-operating in the study of the problem since the outbreak of the war.

The large howitzer types are sure to be motorized, according to Major Lucian B. Moody, who has been in charge of the work. The French 75s and other light types will have to wait for the development of tractors capable of developing a combination of speed for emergencies and pulling power in mud equal to that of horses.

European armies have reduced greatly the number of horses in artillery use. It has not proved possible to eliminate them in hauling certain of the smaller and medium types of ordnance because of the lack of a proper tractor combination of speed and power.

The new creeping, or self-track-laying, type of small or medium size developed by the American Army is built without the steering arrangement in front and while possessing relatively as much power as the type now used in Europe is at the same time capable of turning within its own length by reversing or stopping one of the creeper drivers while the other side continues to move ahead. The experiments with the new types have proceeded far enough to justify plans for the successive motorization of all American artillery units except the smallest calibers required to move at very high speed over bad ground.

DISCUSS MOTORIZING PLAN

Detroit, June 2—Executives from motor factories met yesterday at the Detroit Ath-

letic Club to discuss suitable specifications under which to manufacture supplies for the government and the proposed motorization of the field artillery. Captain William E. Dunn, U. S. field artillery, now on duty in Detroit, told of experiments of the artillery board and predicted that the motorization of the field artillery would produce a saving in money and men. Captain Dunn stated that 5400 trucks would be needed within the next year for the army of 1,500,000 men which the government plans to send abroad. These would release for other service 4040 men and 54,000 horses. Two committees were appointed to investigate the motorization and supply specifications. One committee comprises J. G. Vincent, vice-president in charge of engineering of the Packard Motor Car Co., E. E. Hemp, chief engineer of the Denby Motor Truck Co., and Irving E. Rocamp, technical engineer for the King Motor Car Corp. This committee is in Washington. The local committee includes Leo Anderson, vice-president of the Hupp Motor Car Corp., Charles Denby, export manager for the Hupp Motor Car Corp., D. C. Stanbrough, the Packard Motor Car Co., and Theodore Barthell, the King Motor Car Co.

UNIVERSITY MEN FOR AMBULANCES

Washington, D. C., June 1—The United States Army Ambulance Corps will have 1500 picked men from universities throughout the country for ambulance service abroad. Thirty-two colleges already have contributed men. The corps is to be organized into units of thirty-six men each. They will go into training near Philadelphia and will sail just as soon as possible after their equipment is complete. The Surgeon General has requested the Inter-collegiate Intelligence Bureau to assemble the students for this service. As soon as the call was sent out many institutions immediately formed special classes in military tactics, first aid and French. Further training will be given at the mobilization point.

APPOINT PERSHING'S CHAUFFEURS

Washington, D. C., June 1—John J. Jennings, George Limthicum, Elgin Brain and Ray Middleton have been selected by the War Department to go to the front in France as motor drivers with General Pershing. They were recommended by the Society of Automotive Engineers to the Government, who asked that the society recommend drivers of standing and marked ability. All of these have volunteered their services.

PAIGE PROFITS \$770,533

Detroit, June 4—The Paige-Detroit Motor Car Co. has had net profits of \$770,533 for the year ending Nov. 30, 1916, and a net income of \$959,954. Gross sales aggregated \$10,588,406. These figures have just been reported by the Paige-Detroit Motor Car Co.

Tax Shifted to Owners

Five Per Cent Levy on Motor Cars at Factory Is Eliminated

Amounts to Vary From \$7.50 to \$25, According to Prices

WASHINGTON, D. C., June 1—The elimination of the 5 per cent manufacturing tax on motor cars in the war tax bill, as passed by the House, and the levying of a new Federal license on owners, ranging from \$7.50 to \$25, with reduction for cars used a year or more, were agreed on today by the senate finance committee.

Treasury experts estimate that 1,400,000 owners are subject to the \$7.50 tax, 760,000 subject to the \$10 levy, 1,219,000 subject to the \$15 rate and 231,000 in the \$20 class.

The committee's section would provide:

"That on and after July 1, 1917, special taxes shall be and hereby are imposed annually on owners of automobiles and motorcycles, the rate of tax to be based on each automobile or motorcycle as follows:

"Motorcycles, \$2.50; automobiles, listed retail price at time of purchase not over \$500, \$7.50; over \$500 and not over \$1,000, \$10; over \$1,000 and not over \$2,000, \$15; over \$2,000 and not over \$3,000, \$20; \$3,000 and over, \$25.

"Provided that the special taxes herein imposed shall not apply to manufacturers and dealers as to unsold automobiles and motorcycles held for sale or to owners of automobiles or motorcycles used exclusively for business; provided further that evidence of payment of the tax shall be by receipt or stamp to be attached to automobile or motorcycle, under such rules and regulations as may be prescribed by the commission of internal revenue, with the approval of the Secretary of the Treasury, and provided further that the special tax paid within a fiscal year shall not be imposed again within that fiscal year if ownership changes."

Annual taxes on the different cars are as follows:

\$7.50—Ford, Saxon.
10.00—Briscoe 4, Buick 4, Chevrolet 4, Dodge, Maxwell, Oakland 6, Overland 4, Reo 4, Saxon 6, Scripps-Booth 4, Studebaker 4.
15.00—Briscoe 8, Buick 8, Chalmers, Chandler, Chevrolet 8, Cois, Franklin, Haynes 6, Hudson, Hupmobile, Jeffery, Jordan, King, Kissel, Lozier 4, Mitchell, Moline, National 6, Oakland 8, Oldsmobile, Overland 6, Paige, Premier, Reo 6, Scripps-Booth 8, Stearns 4, Studebaker 6, Sun, Velle, Willys-Knight.
20.00—Cadillac, Haynes 12, Lozier 6, National 12, Peerless, Stanley, Stearns 8, Stutz, Winton 33.
25.00—Locomobile, Flat, Marmon, Mercer, Packard, Pathfinder, Pierce, White, Winton 48.

U. S. MILITARY ROAD

Chicago, June 2—The establishment of extensive permanent as well as temporary quarters for training stations at the Great Lake station and the officers'

reserve corps camp at Fort Sheridan will result in what can be called primarily a military road between Chicago and Waukegan. The highway is to be put into condition for the operation of heavy army motor trucks, of which 150 will be employed in hauling supplies to Fort Sheridan and the naval station from Chicago.

Already the Northwestern railroad and the Chicago, North Shore & Milwaukee have offered their engineers for the work. As this stretch is organized as Sheridan road, the efforts of the Sheridan Road Improvement Association, as well as those of the military encampments and the towns on the route, will be devoted to the speedy construction of the road.

The Government is expected to spend \$18,000,000 in enlarging the Great Lakes training station alone, and it is planned to accommodate 27,000 men in permanent quarters by next October. The work of establishing the military highway will be accomplished by special assessment to a large extent. Co-operation has been promised by Governor Frank O. Lowden, and an appropriation, it is said, will be asked from the present legislature. Samuel M. Hastings, mayor of Highland Park and president of the Illinois manufacturers' association, is chairman of the executive committee, while Commandant W. A. Moffett of the Great Lakes and Colonel W. J. Nicholson of the Fort Sheridan camp are ex-officio members.

NEW DIRIGIBLE MAKES FLIGHT

Washington, D. C., June 1—The Navy Department has made public the first flight by one of the sixteen non-rigid dirigibles being built for the navy. This dirigible left Chicago Monday at midnight and arrived at Akron, Ohio, between 4 and 5 o'clock Tuesday. This was merely an experimental flight and not an official test, and no attempt at high speed was made. Sixteen of these dirigibles were contracted for two months ago. The Goodyear Co. is building nine, and the others are being built by the Goodrich Rubber Co., the Curtiss Aircraft Co., and one by the Connecticut Aircraft Co. They will be used with the coast patrol. The men who will operate them are now in training at Pensacola, Fla.

SCHAFER COMPANY OPENS PLANT

Hawthorne, N. J., June 1—The Schaffer Ball Bearings Co. has opened a plant in this city and is producing the Schaffer ball bearings in duplication of the European product. By the end of next month it expects to produce on the average about 3000 finished bearings a day. This company is the successor to the interests which prior to 1914 imported these bearings from Europe and is backed by American capital and interests. C. Barthel is president and treasurer, M. Daly is vice-president, F. P. Lyons is secretary, and J. H. Zeller, chief engineer.

Needs 10,000 Flyers

Howard Coffin Tells Club American Army of 1,000,000 Needs 5000 Planes

British Airman Says College Men and Boys Are Best

WASHINGTON, D. C., June 1—That "it is a blind army which goes into the war without airplanes" and "in the battle in which there are twenty-eight airplanes lost there are thousands in the air" was asserted by Howard Coffin, chairman of the aircraft production board of the Council of National Defense, in an address before the University Club of Washington. Mr. Coffin says that for 1,000,000 Americans in the field there should be 5000 airplanes. Mr. Coffin expressed the view that 10,000 flyers are needed for the European war service.

France found it required 50,000 aeronautic mechanics, and Mr. Coffin pointed out that the United States troops going into the European war must depend on the aircraft of the allies until America is in position to do its turn.

The statement of Mr. Coffin is of much interest, especially when taken in connection with the recent statement by the aircraft production board, through President Hawley of the Aero Club of America, that the immediate training and equipment of 10,000 American air men for the European front had been undertaken.

The most desirable men, according to Lieutenant Colonel Rees, British airman with the British war commission and winner of the coveted V. C., are young fellows, weighing up to 170 lbs., preferably college men and boys of eighteen to twenty-five.

"They must be men of more than ordinary endurance," said Colonel Rees, "because they have great responsibility and have to be trusted to use their heads. Their integrity must be unquestionable."

Colonel Rees said that the fighting height was about to be increased from 20,000 to 30,000 ft. by the new type machines being manufactured now.

ROCK ISLAND TESTS TRACTOR

Rock Island, Ill., June 2—A new caterpillar tractor that can perform every known trick from submarine exploits to climbing trees was given a demonstration this week before a board of military critics at the Rock Island arsenal. Present were Colonel Burr, commander of the arsenal; Major Ramsey and Captain Capron of the U. S. army, and other officers. The first move was to operate the tractor into a deep clay pit, dragging a 4.7 field piece and carriages with it. Without pause it thrust its iron beak up the opposite side and waded into a deep swamp. Engine and all went under water. The machine plowed its

way out without losing any of its train, and the route was retraced. Some trouble was experienced in negotiating the bank after leaving the water, but a couple of railroad ties were dropped in the path, giving the necessary footing. A steep bank was ascended. A tree 6 in. in diameter was cut off without retarding the progress of the machine. Permission was granted by the war department to film the exhibition, and the reproduction will give an idea of the power of these war tractors and their value at the front.

DREXEL DISSENSION DISAPPEARS

Chicago, June 4—Internal dissension and financial difficulties which threatened to disrupt the Drexel Motor Car Corp. have been ironed out, apparently, and according to A. J. Farmer, president and general manager, the concern will proceed on a better foundation than heretofore. Early in May, Farmer, who owns the patent on the sixteen-valve engine, said to be Drexel's most valuable asset, was asked to resign and temporarily ousted on a charge of mismanagement. This became public when two South Side banks became involved through investigations of bank examiners. One of the banks financed the Farmack Motor Corp., predecessor of the Drexel concern, and Thomas McFarland, president of these two banks, was said to be a heavy stockholder in Drexel and the Drexel organization was reported to be heavily indebted to one of these banks.

Last Saturday there was a creditors' meeting at which it was voted, according to Farmer, to withdraw all claims for the present and the matter is to be taken up with Judge Carpenter of the Federal court this week. Yesterday a directors' meeting was held at which stockholders agreed to furnish additional funds to put the concern in good financial condition. Officials who started the dissension resigned and Farmer is back at the head of the organization. The men in the plant were laid off temporarily while the difficulties were being smoothed out, but Farmer says they will be put to work again in a few days.

Another directors' meeting will be held next Sunday.

TITAN MOTORS CO. FORMS

Detroit, June 2—The Titan Motors Co. has been formed in this city with a capital of \$350,000 with A. A. Gloetner, who is in charge of the sales, engineering and service departments of the Covert Gear Co.; Carl C. Hinkley, chief engineer of the Chalmers Motor Co., and Louis Mendelssohn, treasurer of the Fisher Body Corp., incorporators. The company will manufacture engines for trucks, passenger cars, airplanes and submarines. For the first six or eight months a temporary plant which has been leased will be used and production will start with twenty-five engines a day, which officials of the company state is a very low figure as compared to production plans a year hence. An option

because Congress could not give the \$5,000 necessary for harbor improvements. There was no Gary then, for Gary came later.

At Miller let the motorist remember that Lieutenant Swearingen of the First United States Artillery led his troops around the foot of Lake Michigan on a long march from Detroit to the mouth of the Chicago river. They were on their way to build Fort Dearborn. Captain Whistler, commander of the garrison, we are told, had preceded the troops in the good ship Tracy, which carried supplies for the fort, so the soldiers were able to make the trip in much less time than if they had transported the supplies, and Swearingen's diary tells that the Detroit-Chicago trail was covered in one month and three days, a trip now of less than one day for the motor car.

Road Follows Lake

The road follows the shore of Lake Michigan from the mouth of the St. Joseph river, where Swearingen stopped at "Kinzie's Improvement," now Niles, Mich.; through New Buffalo and Michigan City, past Chesterton to Porter and Miller. This was also the route of the little band of troops. Then it was a branch of the Sauk trail used by the Indians who went to Detroit and other trading stations to bargain their pelts.

Swearingen and his band camped on the site of the pageant Aug. 15, 1803. An Indian village occupied the location of Michigan City. At Miller the old Sauk trail runs into the main trail. Every foot of the road has its history of romantic timber. What wonder that the motorists who follow it to the dune site are willing to work for a national park that the history of the region may not be dimmed by commerce.

There is hope of a national park. Stephen T. Mather, director of national parks, gives unbounded praise to the sand dunes as objects of scenic beauty and scientific interest in a report to Congress and estimates that from 9000 to 13,000 acres of the sand dune country should be included in a park. The cost of the purchase of a strip a mile wide and 15 to 20 miles long on the southern shore will be from \$1,500,000 to \$2,000,000. The estimated cost of maintenance of the park is \$15,000 a year. The dunes are accessible to 5,000,000 persons and are located in the center of population.

TO SHOW USED CARS

Minneapolis, Minn., June 1—The Minneapolis Automobile Trade Association will have a used car show in July and is negotiating for five floors of a store and office building under construction. Each entry will be inspected and will carry a seven-day guarantee when sold. Sales may be removed each night at 6 o'clock. Persons who have not obtained free tickets from dealers will pay 25 cents for entrance. The executive committee in charge is H. E. Pence, F. E. Murphy, J. A. Graham, B. E. Stimson and D. A. Odell.

Winter Slows S. A. Sales

Coming of Cold Season Decreases Business of Motor Industry in Argentine

Short Crops Have Brought Low Buying Power to Camp

BUENOS AIRES, May 10—Winter is now coming on in Argentina, which means the slowing up in the sale of motor cars, and while there is never snow in this city it gets very cold during June and July, which are the winter months. There is frequently ice on small pools and sales correspondingly slow up.

The motor industry is not in the best of condition and has been suffering for a year because of poor crops and distress brought about by the exceptionally cold winter a year ago. In Argentina the camp, or country, represents 80 per cent of the motor car purchasing power of the country. The buying capacity of the camp, or country, depends largely on the wheat crop, maize crop and road improvement. Last year there was a great shortage of the wheat crop due to the prolonged drought and locust troubles. In spite of this there was good selling of motor cars, and those dealers who had quantities on hand had no difficulty disposing of them. One dealer representing a large U. S. A. producer sold over 300 cars in practically two months. He was fortunate in having a large stock on hand ready for delivery.

Dealers Are Uncertain

Argentina is rather uncertain as to what the entry of the U. S. A. into the war will mean so far as the motor industry is concerned. Dealers here are wondering if export of motor cars will be cut down owing to motor car factories being requisitioned by the government for the manufacture of munitions. It is expected that reduced shipping facilities and higher war and insurance lists will have their effect on limiting exports.

Dealers here are indulging in much speculation as to whether U. S. A. manufacturers, who since the war have become the sole purveyors of this market, will be able to hold the trade after the war. Gossip among dealers here to this effect is based largely on the fact that American manufacturers refuse to believe that motor car requirements here are any different from those in the United States. It is getting generally understood that American manufacturers will not continue to supply cars with 60-in. treads, and the dealers look upon this as one more example of the tendency of American manufacturers to self-glorification. Some dealers consider that the refusal to supply 60-in. treads is equivalent to American manufacturers' voluntarily relinquishing the hold they have on this market. Dealers here believe that European manu-

facturers have learned great lessons in quantity production during the war and that when the war is over they will meet the requirements of Argentina in quantity production.

Dealers here feel strongly on the question of 60-in. treads, as well as on that of magneto ignition. The battery is little understood in Argentina, and service buildings are not located conveniently as in the U. S. A. Here 80 per cent of the cars go onto the large farms of the camp, where they are given hard treatment and where the battery proves one of the early sources of trouble. It is because of this extreme service that Argentine dealers have been demanding the magneto. One large American manufacturer who for many months held out against fitting the magneto has now found it good business to fit it.

CARS IN ORIENT INCREASE

Cars in the Orient are coming into their own. In spite of war conditions the Hongkong government is continuing the improvement and extension of the roads of the colony so as to accommodate motor car traffic, both in what is known as the "new territory," that is, the mainland portion of the colony and on the island. Particularly as to the road around the island, work is being pushed with much vigor. There has been a heavy increase in motor car traffic in the colony, although the use of such cars will always be limited because of the restricted topographical field for them. The number of cars now in use in the colony is 105, as compared with seventy-two two years ago. The greatest change, however, is in the fact that whereas the seventy-two cars at that time were nearly all owned by public garages and were largely for tourist use, the greater part of the increase has been in private cars used by their owners for pleasure only.

The nature of business carried on in Hongkong and the limited size of the colony's business district are such that few cars ever will be used for commercial purposes. There are two fairly good sized motor trucks in use in the colony and one large baking establishment uses a delivery car of American make between its plant and its downtown office. Almost all of the cars now in use are American and it is a notable fact that most of the first private owners of cars in Hongkong were Chinese.

After sixty-six years of activities the foremost horse-vehicle landmark in China now is recognizing the steady advancement in the sale of motor cars at Shanghai. This pioneer establishment originally afforded all the facilities of a successful American livery stable, subsequently added a coach-making department under the supervision of a number of foreigners, employing 350 skilled Chinese workmen. More recently the coach builders have been extensively employed in making motor car bodies ranging from commercial vans and small runabouts to elaborate limousines.

New Texas Motor Law Is Drastic

Taxation Plan Comprehensive—Levy on Ford \$17.25; Other Cars in Proportion

ON JULY 1, Texas' new motor and bus law becomes effective. Under this law there will be a change in the registration of cars. It means that cars will be numbered by the state instead of by the counties. It means too, that car owners must pay into the coffers of the state between \$5,000,000 and \$6,000,000 annually in taxes. Of this amount more than \$1,500,000 will go for the betterment of the county roads, under the state highway commission bill.

The average car owner, whose car has a taxable valuation of \$450, must pay a total tax of \$23.10, plus the war tax. The Ford car owner, whose car has a valuation of \$250, will be compelled to pay to the state, county and city a tax of \$17.25 annually. This figure is based on the following: Tax, 35 cents per horsepower, all cars figured at 20 hp. or over, amount \$7.50; state and county tax, average \$1.10 per \$100 valuation; city tax rate, average \$1.80 per \$100 valuation plus the \$3 registration fee.

Estimate Revenue at \$5,000,000

The estimate of the total tax valuation of more than \$5,000,000 is based on the estimate that 260,000 cars are in operation in Texas, the tax to be as follows:

Tax of 35 cents per horsepower, every car having average of 20 hp.	\$2,730,000
State tax rate of 60 cents per \$100 valuation, each car to have a valuation of \$450, average \$2.70 per car, total of	702,000
County tax rate average 54 cents per \$100 valuation, total \$2.43 per car or a grand total of	631,000
City tax rate average for thirty largest cities of the state where it is estimated 40 per cent of cars in Texas are in operation, tax rate averaging \$1.80 per \$100 valuation, each car having valuation of \$450 with 94,000 cars in operation, a grand total of	761,400
License fee of \$3 per car, a grand of	801,000
Grand total for all character of taxes	\$5,625,400

This estimate, it is pointed out by the state department, is based on an exceedingly low valuation and it is thought when the assessments are made there will be great increases. The tax rate for a 50-hp. car and a valuation of \$1,000 will be a total of \$49.50. It is pointed out, however, that the percentage of high-priced cars compared with the number of low-priced cars in the state is exceedingly small.

By the time this law is effective, July 1, the members of the state highway commission are to be appointed. Deputies will also be named and the work of registration will immediately begin. Failure properly to register means the filing of misde-

meanor charges, fines therefor to range from \$10 to \$25. The funds derived from these fines are to go to the state highway commission and will be used for the betterment of the highways.

In addition to this fee for passenger cars the law fixes the annual license fee based upon the carrying capacity per wheel as follows:

Weight in pounds per wheel	Fee
1001 to 2000	\$ 20
2001 to 4000	40
4001 to 6000	60
6001 to 8000	150
8001 to 10,000	300

For loads greater than 10,000 lbs. per wheel license fees shall be charged for each vehicle at the additional rate of \$500 for each 1000 lbs. increase in weight, or fraction thereof.

There are other salient features of the law. The most important are these:

Every car or motor vehicle shall carry a state number, showing the words, "Registered Motor Vehicle, Texas." Heretofore the numbers have been issued by the respective counties of the state.

Every car shall display this license plate and number in the front and rear of each car.

For the remainder of this year, from July 1 to Dec. 31, each car owner will be compelled to pay half the annual fee and tax for his car.

Any manufacturer or dealer in motor vehicles, may in lieu of licensing each car take out a general license number for a fee of \$15.

Non-residents Exempt 90 Days

Motor vehicles from other states are exempt from the provisions of this act for a period of ninety days, upon proof they have complied with the motor vehicle laws of some other state. However, if he remains in the state for thirty days he must pay a fee of \$1.

This law is said to be one of the most drastic in the United States. It is an unusually lengthy bill and the constitutionality of it has been questioned, although this question has never been carried into the courts. It is very likely, however, after July 1, the questions involved will be tested by court action. It is claimed by some that the state constitution prohibits the levying of fines against persons for road building.

PHOENIX WORKS PARKING PUZZLE

Phoenix, Ariz., June 1—Ranking of cars along the curb on some streets and parking in the center of others at right angles to the lines of traffic are the two methods which have been adopted by City Manager Robert A. Craig in an attempt to

solve the parking problem for Phoenix. All vehicles stopping at the curb on all the streets are required to stop parallel to the curb and not more than 1 ft. distant. On streets where stalls are provided for parking in the center, only 20 min. is allowed for parking at the curb during business hours.

Twelve blocks in the business district have been laid out for parking in the center of the street, the lines marking the stalls being painted in white on the pavement. Under the regulations prescribed by the city manager all vehicles must be driven into and out of such stalls only by following the directions for traffic, and in no event is any car to be backed out of a stall.

Complete authority to prescribe parking regulations and to vary them from time to time by giving proper notice has been vested in the city manager by the city commission. The ordinance which provides that the city manager may prescribe the parking rules carries a penalty of both fine and imprisonment, the fine not less than \$5 and not more than \$200 and imprisonment for a period of not more than 200 days.

SAVANNAH RESTRICTS TRAFFIC

Savannah, Ga., June 1—Pedestrians in congested districts of Atlanta, as well as the procedure of motor car drivers in discharging passengers and parking cars, are affected materially by the new city ordinance now in effect. Pedestrians must not attempt to cross a street when the traffic officer signals that vehicles must stop. A man may not proceed when traffic is held up in the same direction he is going but must wait for the flag to give him the signal to proceed. When a street is opened for traffic one way pedestrians may not dodge among the stream of cars and cross at right angles.

No motor car can back into a curb except to discharge or pick up passengers, and then can remain in this position only long enough to discharge or pick up same. All cars must park parallel to the curb, and there are very few downtown streets on which a car may park. No taxicab may park on any street in the city, except in front of railway stations, and private cars doing service for hotels, and in the latter instance only, by consent of the stores which may be on the same floor with the hotels.

The limit of fines for violations of the traffic ordinances has been doubled, and from now on the recorder may assess an offender \$50 or thirty days.

Why Industry Will Lose Few

Factories to Need Majority of Automotive Men More Than Field During War

THAT Government control of civilian life during the war would increase but that the automotive industry would only have to provide a small number of men for fighting was the prediction of K. W. Zimmerschied addressing the Detroit section of the Society of Automotive Engineers May 26. The majority of men, even of military age, will be needed in the factories more than in the fields was the reason given for the forecast. Since Mr. Zimmerschied is now in charge of the S.A.E. office in Washington, established to enable the society to work for the Government with the greatest expedition he is well able to speak of these matters.

Mr. Zimmerschied gave the diagram, Fig. 2, as an illustration of the manner in which governmental control increases during war.

In the first stage, A, the military activities are a small part of the total; civilian activity for the military represents another small part of the whole, and natural activities are not much curtailed. Government control affects little but the strictly military.

Civilian Control Begins

Later, in stage B, the sum total of the activities shows a marked increase. Natural activities, however, have decreased. Military activities, and activities affecting the civilian, have shown a great increase, as has government control. This is the stage where government control is placed on gasoline, passenger car use and the like.

In stage C, though the sum total of activities has materially increased, a still further decrease is noted in the natural activities. All other activities show an increase, as does government control.

1—The Effect of Conscription. Every man from 21 to 31 will register, which means about 250 out of 3000 inhabitants, that is, one man out of every ten or twelve. On this basis there is little danger that the automotive industry will be seriously harmed by the draft. The possibility for harm is still further decreased by the fact that anyone necessary to the industry may be exempt—and considered to be giving service equivalent to service on the firing line. This has been the practice in England and has been found very satisfactory.

The following are some of the figures estimated on a basis of 5000 men: Out of 5000, 2000 will register. Of this 2000, 200 will be drawn. Of this 200, 20 might possibly be exempt because of manufacturing necessity. Hence out of a plant employing 5000, the chances are that not more than 200 will be drawn.

2—The Raw Material Market. All disposition of raw materials is subject to the

action of the priority board, which is under the council of national defense. This board first looks out for military need, examines cases of complaints and orders sources of supply to furnish the raw material as deemed necessary. The Interstate Commerce Commission is working in harmony with this board.

Though the priority board is at present chiefly interested in material directly related to munitions, it may later interest itself with the more remote sources of raw material. Under this head would come tractors, farm implements, etc., as affecting the food supply. Also, it would not permit any source of livelihood to be destroyed by war conditions, thereby throwing any one community into dependence.

No fixed priority policy is possible because conditions vary from time to time. This board is co-operating with the French and British, and while conditions are not the same in all three countries, this commission will see that the American industry is protected.

3—The Place of the Industry in War. To-day the automotive industry is vitally necessary to the carrying on of war. It holds the key to the transport situation and renders a quick movement of troops and supplies possible. The first question the industry is asking is how much material is needed and where is it needed.

The Quartermaster Corps uses two types of general purpose trucks—type A of 1½-ton capacity and type B of 3-ton capacity. Due to the construction, the overload capacity of type A is 3 tons, and of type B, 5 tons. A complete booklet describing the specifications of these trucks is now ready.

At present from 35,000 to 40,000 of these trucks are to be used, in the ratio of six type A trucks to one type B.

In the ordnance department the requirements for trucks are different. Any truck mounting armor plate is considered to belong to the ordnance department, as well as tractors for guns, a few armored cars, and tanks.

Armored cars have not proved satisfactory in the present war. Tanks have been more so, but must be developed. The first British models bear about the same relation to the tanks of to-day as did the first motor car to the present-day car. A board consisting of three army officers and one civilian is at present making tests on some government tanks, and the American tank will be developed as fast and as well as circumstances permit.

Each division of 28,000 men will require

625 trucks, forty-eight ambulances and twelve airplanes.

The Engineer Corps uses trucks about the same as the Quartermasters' Department. These constitute wrecking, erecting and specially equipped trucks suitable for bridge building and other engineering work.

Under the signal corps is the aviation corps; hence the signal corps uses many trucks of the quartermaster type, trucks equipped with wireless, trucks for raising and lowering captive balloons, repair trucks, trailers and airplanes.

Though there has been no little fear and speculation on the development of the airplane in the United States, there is little cause to worry. Progress has been slow but taken up in a logical manner. The first problem was that of getting pilots, next to get machines in which to teach the pilots and third to get a sufficient supply of war planes.

Military Training Necessary

Experience on the continent has proved that military training is the first requirement in the development of an aviator. In the Canadian contingent this was not done at the beginning of the war, and it was found that the fliers were too independent and lacked military training. The flier must first be a soldier and next an aviator.

Aviation schools are being founded all over the country. There will be schools at Berkeley, Cal., Cornell University, University of Texas, University of Illinois, University of Ohio and University of Massachusetts. At present the course lasts from one month to six weeks, though later it will extend through a period of two months. The student receives instructions in meteorology, aero-dynamics, physics and on about twelve subjects as the basis of flying. At the same time he is receiving military training and preliminary instructions in flying. There are some few university graduates who have had this preliminary training. These were accepted by the aviation department and are now in the existing schools.

Funds have been appropriated for many fields to be used in airplane instruction. The three first are the Joy field at Mount Clemens, a field at Dayton, Ohio, and another at Champaign, Ill. Doubtless inside of three months these fields will be going full blast, getting the second and third line recruits in order.

A complete flying squad comprises twelve airplanes and 174 men. Hence, if 1000 planes were in use the aviation department would require 173,000 especially trained men. Each school field has about two

squadrons, 144 cadets, 600 enlisted men, 48 non-commissioned officers, 36 commissioned officers, 24 instructors, and 72 airplanes; within the next twelve months, 3500 airplanes will be constructed for instruction purposes. This will be enough to care for all the fliers.

The requirements for the war planes are much higher than those for the instruction planes. The two difficulties confronted are that there are few expert workers on hand and that the engines are very hard to build. Our task is to make airplane engines on a production basis. Concerning the war planes, plans are not so definite as with the instruction planes, but the country has nothing to fear. When our real army goes it will have its full quota of well-equipped fliers and airplanes.

4—Activities in Farm Tractors. There is a committee on farm tractors getting behind the manufacturers, protecting labor, and providing for plenty of tractors. Farmers must be taught to operate the tractors after they are built, and neighbors not individually having farms large enough to merit a tractor will be grouped together to use a community tractor. It is estimated that the tractor will increase the grain yield 500,000,000 bus. This will be 50 per cent increase of the maximum 1917 production. In addition the Department of Agriculture is working night and day and co-operating with the British.

In closing, Zimmerschied stated that vast

problems are confronting us—that mistakes will be made—but in the end we shall come out three times the victors.

CLARKSON ON S. A. E. WORK

Washington, D. C., June 2—Discussing a conference between representatives of the Society of Automotive Engineers and War Department officials touching truck specifications, especially in connection with bids soon to be opened in Chicago for 70,000 trucks, Coker F. Clarkson, general manager of the society, made this statement:

The automobile engineers have cooperated even beyond expectations in the formulation and putting into effect of military truck specifications for the War Department. For over a year the Society of Automotive Engineers has, through its various committees, been working with the Quartermaster General's office and the War Department Motor Transport Board in the preparation of specifications which have been issued recently in booklet form in connection with the request for bids from manufacturers to furnish 70,000 military trucks.

A two-day meeting was finished tonight in the rooms of the advisory committee of the Council of National Defense, representatives of engine, transmission and truck manufacturers being present. As a result of this meeting the very important and highly valuable decision has been arrived at that the engines and transmissions to be used in many of the military trucks will be interchangeable, without regard to the particular make of transmission and engine.

This will not only facilitate the putting of the necessary number of trucks into service but will decrease greatly problems connected with the replacement of parts and the making of emergency repairs in the field. The details of this fundamentally important plan are being followed up, and weekly meetings will be held in Detroit and Washington in consummation of it. The manufacturing considerations which engine, transmission, axle, radiator and frame manufacturers encounter will be reconciled to a

degree not heretofore thought possible. Among those attending the meetings were:

George W. Dunham, president of the Society of Automotive Engineers; John G. Uts, chairman of the standards committee; K. W. Zimmerschied, past chairman of the standards committee and chairman of the automotive committee of the Advisory Commission of the Council of National Defense; Capt. W. M. Britton, motor transport engineer of the Quartermaster General's office; Coker F. Clarkson, general manager of the Society of Automotive Engineers; A. W. Copland, chairman of the transmission division of the S. A. E.; W. A. Frederick and G. W. Yeoman, Continental Motor Mfg. Co.; H. L. Horning, Waukesha Motor Co.; R. J. Bryce, the Buda Co.; A. F. Milbrath; Wisconsin Motor Mfg. Co.; O. J. Strayer, J. M. Cook, E. O. Spillman, Herschell-Spillman Co.; E. P. Reber, Cotta Transmission Co.; E. W. Miller, Fellows Gear Shaper Co.; A. C. Bryan, Duration Gear Co.; L. C. Fuller, Fuller & Sons; H. W. Chapin, A. E. Parsons, Brown-Lipe Gear Co.; A. A. Cloetner, Covert Gear Co.; L. P. Kolb, Kelly-Springfield Motor Truck Co.; C. B. Rose, Velle Automobile Co.; R. W. Austin, Gramm-Bernstein Motor Truck Co.; E. E. Wemp, Denby Motor Truck Co.; W. A. Olen, R. M. Newbold, Four-Wheel-Drive Auto Co.; J. E. Cramlich, Sanford Motor Truck Co.; G. V. Doremus, Service Motor Truck Co.; K. K. Hoag of the Washington S. A. E. office.

Never before in the history of the automotive industry have various commercial interests so effectively and completely given up all individual considerations for the purpose of evolving a product with nothing in view but the common good. In so doing the industries involved have contributed their total resources to the successful prosecution of the war. The value of the work is greatly increased by the fact that the trucks involved are not only of great military value but will be particularly satisfactory for commercial use, principally for owners of large fleets in cities.

This magnificent piece of work therefore insures that when the American army finally appears on the field of battle in France it will be equipped with motor trucks which for quality of design and reliability of performance will be superior to the truck equipment of any other army that has ever taken the field.

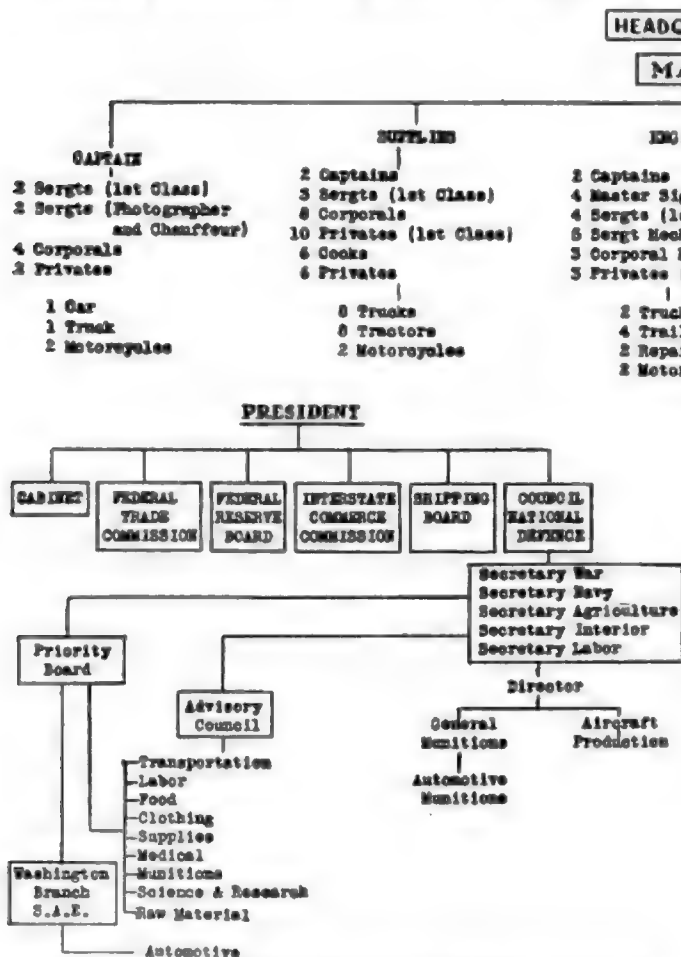


Fig. 1—Diagram of wartime organization, showing plan of automotive industry in war work

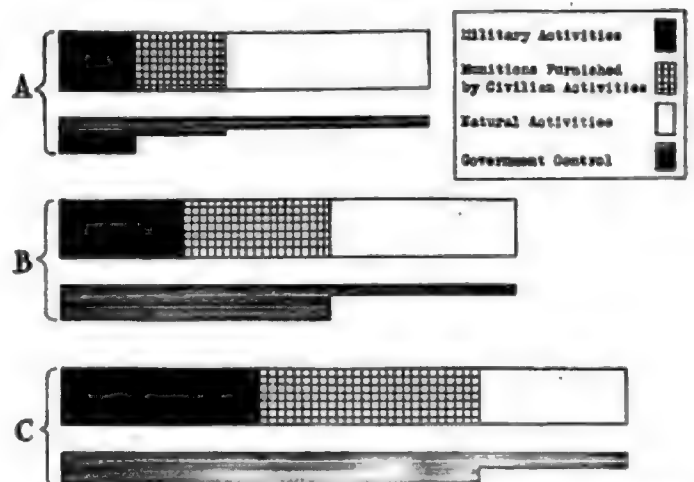


Fig. 2—How government control increases during war, as outlined by Mr. Zimmerchied

delay that members of the party do not grumble about because it shows that the work is being done and that the great hope of the association, a hard-surfaced road all the way from Winnipeg to New Orleans by 1919, bids fair to be realized.

The party left Kansas City Monday morning, May 21, on schedule, but it had rained all Sunday afternoon and most of the night and they were in heavy going at once. They ploughed along, losing schedule all the time, and at one time altogether lost Premier Norris who was in a relay car. When they got into Nevada, however, they found him addressing a big meeting. He had hopped a handy train after his car had lost its way. The speakers took the night train into Joplin, Mo., and the cars traveled until 3 a. m. into Carthage. They started again early in the morning and made Joplin 3 hrs. after they should have been leaving. After a short rest the cars proceeded, the speakers having gone by train to Vinita where they received a rousing welcome. The cars passed through Vinita while the meeting was in progress and reached Muskogee without further trouble. Out of Muskogee they were on schedule and have been ever since with the exception of Friday afternoon as noted.

Trip Well Planned

The battle with the mud on Monday and Tuesday proved the thoroughness of arrangements for the trip at every stage. Relay cars came all the way while relay drivers and mechanics stayed with the official cars and spelled the regular drivers. Two blowouts was the sum total of the accidents in the heavy going. Since then the relay escorts have been large all along the road, but have never been needed.

Through the whole of Oklahoma the weather was cold and cloudy. The sun shone in Texas and it was warm going into Mount Pleasant. Louisiana gave the party a warm welcome in more ways than one, as the heat was almost oppressive yesterday afternoon.

The enthusiastic welcome which greeted the party at every stage of the trip in northern territory has grown steadily as progress has been made southward. It reached its climax at Shreveport, where 10,000 people in Texas street blocked street car traffic for over an hour while speaking was in progress. Interest in the trip has grown steadily, gaining momentum probably because news of its success has preceded the party from day to day through the newspapers. People now know what is awaiting them, and the great numbers in which they turn out is the best evidence that they want what they are expecting. Talk about the Jefferson is listened to with interest, but it is the talk of Premier Norris and Mayor Davidson on the war and Canada's actual experience in war and their appeal for individual realization of its seriousness that appeals to the imagination and arouses the wholehearted enthusiasm of all who hear them.

Prominent men have joined the party at different points and accompanied them for varying distances. D. N. Fink, president of the Jefferson Highway Association, joined the party at Kansas City and was with them two days to McAlester, Okla. His home is in Muskogee. W. N. King, vice-president of the association for Texas, joined at Denison with Julian C. Field, consulting engineer to the highway for Texas, and both came through to Shreveport. With them was J. F. Reynolds, mayor of Pittsburg, Tex. Paul Nesbitt, speaker of the Oklahoma House of Representatives, joined at Muskogee, with Mrs. Nesbitt, and came through to the state line. W. F. Dodd, highway director for Texas, came from Caddo to Greenville. Fred Horton, director for Texas, came from Denison to Sulphur Springs. Governor Biffin G. Pleasant of Louisiana came to Shreveport and motored out 15 miles with the reception committee to greet Premier Norris and welcome the party into Louisiana. He accompanied them to Mansfield this afternoon. Governor Pleasant made impressive speeches at Greenwood and Shreveport and joined the party at dinner Saturday night in Shreveport.

Leaving Shreveport Sunday afternoon for the 42-mile run to Mansfield, the night stop, the official cars were followed by an escort of more than 10 miles of Louisiana cars, running with only comfortable working space between them. In many respects it was the most spectacular feature of the whole trip and an index of the great enthusiasm which the visit of the Canadian officials has inspired.

From Kansas City to Shreveport the party has run over all kinds of roads, some of the finest sand and gravel road possi-

ble. This is especially true of the roads in Texas. There have been some rough stretches, but not a foot on which a good permanent road could not be built at reasonable cost. In most places the appropriation has already been made, in many of them contracts have been let and in many work is now under way. People everywhere have been found to be strong for the Jefferson highway, and determined to make their section of it up to standard. The idea of a national and international highway from north to south has touched and impressed the imagination of big men. They see more than their own local part of the road.

The Jefferson highway is not yet a highway. It is not a road. It is something bigger and better. It is an idea that is surely seizing the minds of men and spurring them to big work and big expenditures. Soon the idea will have blossomed into a reality and the Jefferson highway will have become what General Manager Clarkson set as the only goal of his ambition, a 365-day highway from pine to palm, from north to south, from Canada to the Gulf, spanning the whole of the temperate zone and providing a pathway over which the tourist may wander at his will with nothing more to dread than that he may have to fasten on side-curtains if it rains.

Mayor Davidson has even a greater vision. He sees clearly a day when the motor car will be disputing the right of way with the train as a means of locomotion for the business man wishing to travel long distances in short time, and he sees in the Jefferson highway, when completed, a demonstration which will mean networks of such highways cutting the continent from all directions and at all angles.

Answers to Inquiries

Dallas, Tex.-Anderson, S. C.

DALLAS, Tex.—Editor MOTOR AGE—Give best route from here to Anderson, S. C., and approximate mileage.—H. P. Sitton, Jr.

From Dallas proceed to Mesquite, Forney, Terrell, Elmo, Wills Point, Myrtle Springs, Ben Wheeler, Edom, Tyler, Winona, Friendship, Gladwater, Longview, Marshall, Scottsville, Jonesville, Waskom, Greenwood, Flournoy, Shreveport, Minden, Athens, Arcadia, Slusher, Ruston, Choudrant, Calhoun, Monroe, Bastrop, Oak Ridge, ferry across Lake LaForche, Girard, Rayville, Holly Ridge, Delhi, Quebec, Tallulah, Delta, Mississippi River ferry, Vicksburg, Edwards, Bolton, Jackson, Brandon, Fannin, Pisgah, Morton, Forest, Newton, Hickory, Chunky, Meridian, Cuba, Ala., York, Livingston, Coatsopa, Moscow ferry across Tombigbee river, Demopolis, Faunsdale, Untontown, Blalock, Safford, Martin Station, Orrville, Hazen, Beloit, Selma, Benton, Lowndesboro, Burkville, Montgomery, Mount Meigs, Shorter, Tuskegee, Notasulga, Loachapoka, Auburn, Opelika, Beulah, Langdale, Layton, Ala., West Point, Ga., Lagrange, Hoganville, Trimble, Grantville, Moreland, Newman, Palmetto, Union City, Fort McPherson, Atlanta, Druid Hills, Decatur, Inglewood, Clarkston, Stone Mountain, Snellville, Grayson, Between, Monroe, Athens, Ill., Franklin Springs, Royston, Hartwell, Brown's ferry across Savannah river, then on to Anderson.

Vols. 7 and 6 of the Automobile Blue Books, published by the Automobile Blue Book Pub. Co., 910 South Michigan avenue, Chicago, contain complete running directions for this trip.

Memphis, Tenn.-Atlanta, Ga.

Memphis, Tenn.—Editor MOTOR AGE—Give route from here to Atlanta, Ga. What equipment is necessary?—J. M. King.

From Memphis go to Raleigh, Bartlett, Elendale, Arlington, Gallaway, Braden, Mason, Stanton, Brownsville, Harvey, Jackson, Rollins, Springcreek, Terry, Huntingdon, Camden, Tennessee River ferry, Trotter's Landing, Hustburg, Waverly, McEwen, Dickson, Charlotte, Bellburg, Fardue, Cumberland River ferry, Ashland City, Bordeaux, Nashville, LaVergne, Jefferson, Walter Hill, Murfreesboro, Denson, Shelbyville, Bellville, Fayetteville, Tenn., Hazel Green, Ala., Huntsville, Owens Cross Roads, New Hope, Cottonville, North, Tennessee River ferry, Guntersville, Albertville, Boaz, Mountainboro, Attalla, Alabama City, Gadsden, Rome, Ga., Cartersville, Emerson, Allatoona, Acworth, Kennesaw, Marietta, Smyrna to Atlanta.

Vol. 6 of the Automobile Blue Book published by the Automobile Blue Book Pub. Co., 910 South Michigan avenue, Chicago, con-

tains complete running directions for this trip.

We cannot advise you as to equipment, as so much depends on individual demand, whether the tourist plans on camping, making the trip slowly, etc. The above trip is not a very long one, being a little less than 600 miles.

Abilene, Tex.—Ashley, Mo.

Merkel, Tex.—Editor MOTOR AGE—Give a route from Abilene, Tex., to Ashley, Mo.—G. E. Comegys.

From Abilene drive to Hamby, Albany, Woodson, Throckmorton, Elbert, Padgett, Olney, Archer City, Wichita Falls, Burkburnett, Randlett, Lawton, Fort Sill, Apache, Anadarko, Verden, Pocasset, El Reno, Yukon, Packington, Oklahoma City, Depew, Bristow, Kellyville, Sapulpa, Bowden, Red Fork, Tulsa, Collinsville, Claremore, Sequoyah, Bushyhead, Chelsea, Catale, Venita, Miami, Commerce, Lincolnville, Baxter Springs, Lowell, Galena, Joplin, Galesburg, Nashville, Liberal, Brenau, Moundsville, Nevada, Horton, Arthur, Rich Hill, Butler, Adrian, Archie, Harrisonville, Kansas City, Independence, Levasy, Wellington, Lexington, Waverly, Grand Pass, Marshall, Arrow Rock, Booneville, ferry across Missouri river, New Franklin, Rochepoort, Columbia, Stephens' Store, Concord, Shamrock, Martinsburg, Middletown, New Hartford to Ashley.

Vol. 7 of the Automobile Blue Book, published by the Automobile Blue Book Pub. Co., 910 South Michigan avenue, Chicago, contains running directions on the above trip as far as Columbia.

Superior, Wis.—Montpelier, Vt.

Superior, Wis.—Editor MOTOR AGE—Give routing from here to Montpelier, Vt., with change of route for return trip.—H. R. Corey.

From Superior drive to Itasca, Hawthorne, Lake Nebagamon, Barnes, Drummond, Bibon, Ashland, Marengo, Mellen, Glidden, Butternut, Phillips, Ogema, Chelsea, Medford, Wausau, Tilleda, Thornton, Shawano, Green Bay, Denmark, Manitowoc, Newton, Sheboygan, Port Washington, Milwaukee, Cudahy, South Milwaukee, Racine, Kenosha, Waukegan, North Chicago, Highland Park, Evanston, Chicago, South Chicago, Highland, South Gary, Hobart, Wheeler, Valparaiso, Westville, Laporte, South Bend, Kishwaukee, Elkhart, Goshen, Benton, Ligonier, Brimfield, Kendallville, Edgerton, Ohio, Bryan, Wausau, Crissey, Toledo, Le Moyne, Woodville, Clyde, Monroeville, Norwalk, Townsend, Wakeman, Oberlin, Elyria, Cleveland, Willoughby, Painesville, Geneva, Ash-tabula, Conneaut, Girard, Erie, Moorheadville, North East, Pa., Ripley, Westfield, Portland, Lambertson, Fredonia, Sheridan, Silver Creek, Brant, Angola, Bay View, Buffalo, Williams-ville, Batavia, Caledonia, Lima, Canandaigua, Geneva, Seneca Falls, Auburn, Sennett, Camillus, Syracuse, Manlius Center, Chittenango, Canastota, Oneida Castle, Vernon, Utica, Frankfort, Ilion, Herkimer, Little Falls, Neilston, Palatine Bridge, Fonda, Tribes Hill, Amsterdam, Scotia, Schenectady, Albany, Troy, Raymerstown, Potter Hills, Homick, Old Bennington, Bennington, Woodford, Searsburg, Wilmington, Marlboro, Brattleboro, Putney, Westminster, Bellow Falls, Charlestown, Claremont, Ascutneyville, Hartland, White River Junction, Hartford, Sharon, Royalton, East Brookfield, Williamstown, Barre, Montpelier.

For the return trip we have planned a route through Canada, and if you follow this apply for a thirty-day touring permit from the Canadian customs collector at the Canadian frontier. The route follows from Montpelier to Middlesex, Waterbury, Richmond, Williston, Burlington, Chazy, N. Y., Coopersville, Rouses Point, Lacolle, Quebec, Napierville, Douglas Cor-

ners, Laprairie, Montreal, Lachine, St. Anne Isle Perrot Ferry, Cascades Point, Lancaster, Cornwall, Prescott, Brockville, Gananoque, Kingston, Cataract, Napanee, Marysville, Shan-nonville, Belleville, Trenton, Colborne, Cobourg, Port Hope, Bowmanville, Whitby, Pickering, Toronto, New Toronto, Port Credit, Oakville, Bronte, Burlington, Aldershot, Hamilton, Ancaster, Alberton, Brantford, Burford, Cathcart, Woodstock, Ingersoll, Thamesford, London, Hyde Park, Warwick Village, Kertch, Sarula, Port Huron, Mich., Thornton, Goodella, Capac, Imlay City, Lapeer, Flint, Owosso, Ovid, St. Johns, Pewamo, Ionia, Grand Rapids, Berlin, Coopersville, Spring Lake, Grand Haven, West Olive, Holland, Saugatuck, Douglas, South Haven, Watervliet, Coloma, Riverdale, Benton Harbor, St. Joseph, Stevensville, Bridgman, Sawyer, Three Oaks, New Buffalo, Michigan City, East Gary, Miller, Gary, Calumet, East Chicago, South Chicago, Chicago. If you do not wish to repeat the route from this point, proceed through Elgin, Lake Geneva, Janesville, Madison and Stevens Point to Wausau, and then on to Ashland and Superior.

Vols. 5, 4, 3, 1 and 2 of the Automobile Blue Books, published by the Automobile Blue Book Pub. Co., 910 South Michigan avenue, Chicago, contain complete running directions for the above trip.

Philadelphia, Pa.—Covington, La.

Philadelphia, Pa.—Editor MOTOR AGE—Give a route from here to Covington, La., passing through Gettysburg, Pittsburgh, Columbus, Louisville and Meridian. What is the mileage?—A. T. Prescott.

From Philadelphia proceed to Ardmore, Bryn Mawr, Wayne, Daylesford, Paoli, Whitford, Downingtown, Thorndale, Coatesville, Vintage, Paradise, Souderburg, Lancaster, Mountville, Columbia, Wrightsville, Hellam, York, Thomasville, Abbottstown, New Oxford, Gettysburg, McKnightstown, Fayetteville, Chambersburg, St. Thomas, McConnellsburg, Breezewood, Everett, Bedford, Buckstown, Jenners, Ligonier, Greensburg, Adamsburg, East McKeesport, East Pittsburgh, Wilkinsburg, Pittsburgh, Santiago, Florence, Wierton, Steubenville, Wintersville, Hopedale, Cadiz, Moorefield, Piedmont, Londonderry, Antrim, Winterset, Cambridge, Concord, Zanesville, Jackanstown, Newark, Granville, Columbus, West Jefferson, London, South Charleston, Cedarville, Xenia, Wayneville, Lebanon, Mason, Sharon, Cincinnati, Mack, Cleves, Homestead, Lawrenceburg, Aurora, Aberdeen, Vevay, Ohio River Ferry, Carrollton, Ky., New Castle, Eminence, Shelbyville, Eastwood, St. Mathews, Louisville, Shively, Meadow-lawn, West Point, Elizabethtown, Upton, Mun-fordville, Woodsonville, Horse Cave, Cave City, Glasgow Junction, Bowling Green, Auburn, Ros-sellville, Adairville, Springfield, Goodlettsville, Madison, Nashville, Columbia, Mount Pleasant, Rockdale, Lawrenceburg, Loretto, St. Joseph, Tenn., St. Florian, Florence, Sheffield, Tuscam-bula, Russellville, Duketon, Hackleburg, Ham-il-ton, Guin, Vernon, Columbus, Miss., Crawford, Brookville, Macon, DeKalb, Daleville, Meridian, Qultman, Shubuta, Heidelberg, Errata, Laurel, Ellisville, Hattiesburg, Clyde, Oloh, Columbia, Pearl River Bridge, Hopewell, Hickman, Sandy Hook Sta., Bogalusa to Covington.

This trip will approximate 1600 miles. Vols. 3, 4 and 6 of the Automobile Blue Books, published by the Automobile Blue Book Pub. Co., 910 South Michigan avenue, contain complete running directions for this trip.

Springfield, Ohio—Fort Dodge, Iowa

Springfield, Ohio—Editor MOTOR AGE—Have planned to go to Fort Dodge through Indian-apolis, from there to Chicago Heights over the Dixie Highway, to Clinton, Iowa, Marshalltown, and Ames. Can you suggest a better route?—St. John Moreau.

You will find the Dixie Highway very poor in Illinois. We would suggest the following

route: Springfield, Vandalia, Richmond, In-dianapolis, Flackville, Royalton, Lebanon, Mechanicsburg, Antioch, Frankfort, Lafayette, Remington, Goodland, Morocco, Schnei-der, Lowell, Brunswick, Dyer, Frankfort, New Lenox, Joliet, Minooka, Morris, Ottawa, La Salle, Peru, Seatonville, Hollowayville, Princeton, Sheffield, Anawan, Geneseo, Green River, Moline, Davenport, Iowa, Durant, Mos-cow, Atalissa, West Liberty, Iowa City, Coral-ville, Oxford, Marengo, Victor, Grinnell, Kel-logg, Newton, Colfax, Des Moines, Dallas Center, Dayton, Fort Dodge.

Vols. 4 and 5 of the Automobile Blue Book published by the Automobile Blue Book Pub. Co., 910 South Michigan avenue, Chicago, contain complete running directions for this trip.

Texarkana, Ark.—Carlsbad, N. M.

Texarkana, Ark.—Editor MOTOR AGE—Give me routing from here to Carlsbad, N. M.—W. E. Ralph.

From Texarkana, ride to New Boston, Tex., DeKalb, Annona, Detroit, Blossom, Paris, Brookston, Windom, Bonham, Whitewright, Vandalia, Melissa, McKinney, Dallas, Grand Prairie, Arlington Fort Worth, Weatherford, Mineral Wells, Palo Pinto, Caddo, Brecken-ridge, Albany, Hamby, Abilene, Roscoe, Hermleigh, Snyder, Gail, Tahoka, Brownfield, Gomez, Plains, Roswell, Artesia to Carls-bad.

Vol. 7 of the Automobile Blue Book published by the Automobile Blue Book Pub. Co., 910 South Michigan avenue, contains complete running directions for this trip.

Tulsa, Okla.—Suffield, Conn.

Bartlesville, Okla.—Editor MOTOR AGE—Give route from Tulsa, Okla., to Suffield, Conn., via Pittsburgh and New York.—R. F. MacArthur.

From Tulsa, the route goes through Col-linsville, Sequoyah, Chelsea, Catale, Venita, Miami, Lincolnville, Baxter Springs, Kan., Galena, Joplin, Mo., Diamondville, Pierce City, Verona, Marionville, Billings, Spring-field, Galloway, Rogersville, Diggins, Man-field, Macomb, Norwood, Mountain Grove, Cabool, Houston, Licking, Rolla, St. James, Leasburg, Sullivan, Anaconda, St. Louis, Litchfield, Nokomis, Shelbyville, Windsor, Mattoon, Charleston, Grandview, Paris, Ill., Terre Haute, Ind., Rosedale, Rockville, Ho-landsburg, Bainbridge, Danville, Indianapolis, Greenfield, Dunreith, Germantown, Rich-mond, Eaton, O., Dayton, Harahan, Spring-field, Columbus, Granville, Newark, Linnville, Zanesville, Cambridge, Washington, Morris-ton, Bridgeport, Wheeling, W. Va., Wash-ington, Pa., Houston, Bridgeville, Carnegie, Pittsburgh, Sardis, Mamont, Saltsburg, Indi-ana, Barnesboro, Carrolltown, Altoona, Juniata, Bellwood, Tyrone, Schoenberger, Alexandria, Huntington, Lewiston, Thomp-sonstown, Liverpool, Montgomerys Ferry, Speeceville, Coxetown, Harrisburg, Hummels-town, Palmyra, Lebanon, Avon, Werners-ville, Reading, Temple, Kirbyville, Kutstown, Maxatawny, Greinigsyville, Wescoville, Al-lentown, Bethlehem, Farnesville, Easton, Phillipsburg, N. J., Washington, Annandale, Lebanon, Somerville, Bound Brook, Plain-field, Westfield, Cranford, Elizabeth, New-ark, Jersey City, Weehawken, New York, Pelham Manor, New Rochelle, Mamaroneck, Rye, Port Chester, Greenwich, Conn., Stam-ford, Darien, Norwalk, Southport, Fairfield, Bridgeport, Stratford, Milford, New Haven, North Haven, Tracy, Meriden, Berlin, Hart-ford, Windsor, to Suffield.

Vols. 7, 5, 4, 3 and 2 of the Automobile Blue Books published by the Automobile Blue Book Pub. Co., 910 South Michigan avenue, Chicago, contain complete running directions for this trip.

Dearborn Truck Unit for Any Car

Built in 1 and 2-Ton Models

THE Dearborn Truck Co., Chicago, announces two new truck units adaptable for use with any standard chassis. One has a 1-ton and the other a 2-ton capacity. The new units are similar in construction to the original Dearborn attachments which were designed for the Ford car exclusively.

The new 2-ton Dearborn units can be attached successfully to cars having powerplants of 40 to 50 hp., such as Pierce-Arrow, Packard, Peerless, Lozier, Locomobile, Oldsmobile, the larger models of the Hudson and other cars in this class.

Adaptable to the new 1-ton unit, and even to the 2-ton if desired, are such cars as Overland, Maxwell, Buick, Dodge, Studebaker, Hupmobile, Chandler, etc.

Of course the larger units have heavier frame, wheels, etc., than the 1-ton unit, which is really very similar to the original Ford attachment. Some of the specifications of the 2-ton attachment are as follows: 5-in. channel frame, bed axle, 2½ by 2 in. drop forged and heat treated; 3-in. springs, 48 in. long, with nine leaves; an additional relief spring over the rear axle; heavy truck wheels 34 by 5 in.; solid rubber tires, 34 by 5 in.; 1¼-in. pitch Baldwin roller chains and Baldwin steel sprockets and a loading space for a 10-ft. body.

RHAMSTINE KEROSENE ADAPTER

A new type of kerosene carburetion system just put on the market and already adopted by some truck owners is known as the Rhamstine Adapter, and is the product of the Rhamstine Kerosene Adapter Corp., Washington, D. C.

It is used in conjunction with two Schebler carbureters, as shown in the accompanying illustration. One of the carbureters is for starting on gasoline and the other is for running on kerosene. It is claimed that the adapter owes its success to a simple method of atomizing the kerosene. The relative non-volatility of kerosene demonstrated long ago the fact that it is practically impossible to start a cold motor through a cold carburetor on this fuel. Accordingly, a valve was devised which admits of a selective fuel control. In other words, the engine is started on a small quantity of gasoline, which is immediately shut off by the valve when the engine starts to use kerosene with no perceptible change. This valve is controlled from the steering column.

The vaporization of the kerosene seems to be handled in a very practical way. By means of the exhaust the fuel is heated to an average of 135 deg. F. before it enters the standard carburetor. In a like manner the air is heated to an average of 175 deg. F. From the carburetor the mix-



Two-ton convertible unit made by the Dearborn Truck Co. It is applicable to any standard make, in this case being fitted to an old Apperson

ture passes into the adapter, where it is attenuated, dried and thoroughly broken up. At this period the mixture is vaporized and ready for explosion.

It is claimed that both shop and service tests have brought out the fact that the adapter enables the truck driver to change from gasoline to kerosene by means of the fuel control without a falter showing up in the engine.

BOSCH CONCENTRATES PRODUCTS

New York, June 2—The Bosch Magneto Co., with plants in Springfield, Mass., and Plainfield, N. J., has practically decided to concentrate all its energies on the production of a limited number of standard types of magnetos for the immediate future. The Plainfield plant, which has been devoted to the production of electric lighting and starting apparatus, will be closed.

The change follows the resignation of President Otto Heins and several other executives about a month ago and the subsequent resignation of several factory executives and mechanics. All these men

are German subjects with property in Germany and severed their connections with the Bosch company in order not to abrogate their German holdings. Another factor has been the United States Government order forbidding alien enemies to approach nearer than ½-mile to any government munition plant. While the Bosch company has not been producing munitions in the strict sense of the word, the entry of the United States into the war has placed magnetos in the class with munitions because of their wide and general use on government trucks.

Executives of the Bosch company state that the decision to concentrate on a few types of standard model magnetos will not curtail production but will have the opposite effect.

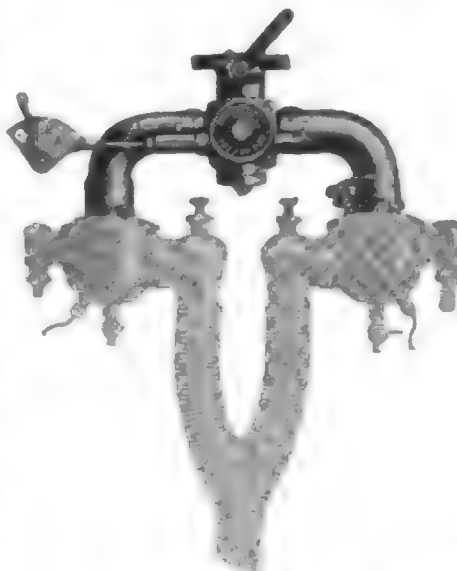
Prior to the entry of the United States into the war, the Bosch company was supplying large quantities of magnetos for truck equipment on vehicles shipped abroad. Shortly thereafter, however, a clause was added to standard contracts forbidding the resale of Bosch equipment to belligerents, and this has somewhat reduced such business. It is believed, however, that this clause will not affect equipment sold to the United States government.

Following the resignation of President Heins, former secretary Carl Schurz was elected to the presidency and now heads the company. Heins has retired temporarily and is spending his time traveling. William De Voe has been elected secretary, and G. Jahn, vice-president and general manager. A. H. D. Altrees assumes the duties of sales manager.

PRICE INCREASES

Toledo, Ohio, June 1 — The Milburn Wagon Co. has announced an advance of \$100 in its car, effective June 15. The present price is \$1,685.

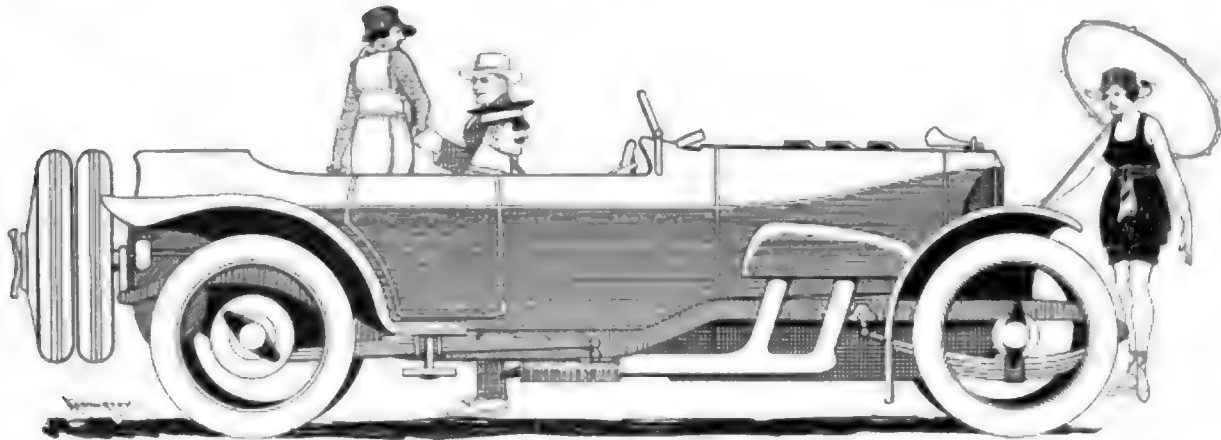
Pontiac, Mich., June 4—The Oakland Motor Car Co. has increased the price of its Sensible-Six \$70, beginning June 1, and the car now sells for \$945.



The Rhamstine kerosene adapter, which uses two Schebler carbureters, one for kerosene and one for gasoline



The Readers' Clearing House



Exclusive MOTOR AGE design for touring speedster

By Kenworthy

OILING SYSTEM FOR FORD SPEEDER Can Enlarge Valves $\frac{1}{8}$ -in. in Diameter Safely

NEW LEBANON, Ohio.—Editor MOTOR AGE—
—I want advice as to an oiling system for a Ford speedster with which I hope to make about 70 m.p.h. I want to use a hand pump with it.

1—How large valves can you use in a Ford?
—C. C. M.

When the usual Ford oiling system is used for high speed purposes, trouble is usually encountered, due to the fact that the oil does not flow down the oil tube which is placed inside the crankcase. Ordinarily the oil is splashed up by the flywheel and a certain amount of it caught in the funnel-shaped end of the oil tube which carries it to the timing gears. From here the oil flows to the connecting-rod troughs and back to the flywheel housing. At extreme high speeds the oil does not get to the timing gears properly by means of the oil tube and some positive means must be employed to make sure that the oil is getting to all parts of the engine.

A suggested oiling system is shown in Fig. 1 and consists of a reservoir placed at any convenient point on the chassis and from which the oil can be pumped to the crankcase by a hand pressure pump. From the crankcase the oil is pumped by a small piston pump, as shown, to a gage on the dash and then to the timing gears. To place the pump on the engine a hole is drilled in the side of the crankcase directly opposite number four exhaust cam, and of sufficient size to allow the head A of the piston to pass through it. The pump parts are made of brass and consist of the tube B screwed into the flange C, the latter being provided with four holes for cap screws which hold the pump in place. The holes for these cap screws in the crankcase are tapped and a leather gasket placed as shown. The pump piston can be made of steel and is actuated at one end by a coil spring, and the exhaust cam on the

other. A bushing D is fitted into B to which the remaining part of the pump is screwed. This part carries the check valves and the manner in which they should be placed is clearly shown in the illustration.

Copper tubing of $\frac{1}{4}$ -in. diameter is used for the leads and the connections made in the usual manner, using the solderless type of connections. One lead goes from the oil tank to the hand pump and a second pipe from the pump to a hole E in the crankcase. At F the usual Ford pet cock

should be removed and a fitting screwed in its place so that a lead can be carried to the lower opening of the engine oil pump. This lead is shown at G. The remaining opening at the top of the engine pump is connected to the upper connection on the gage, and finally a pipe is run from the remaining gage connection to the timing gear case top. A hole must be drilled for this and tapped to fit the type of connector used.

2—You can fit valves about $\frac{1}{8}$ in. larger

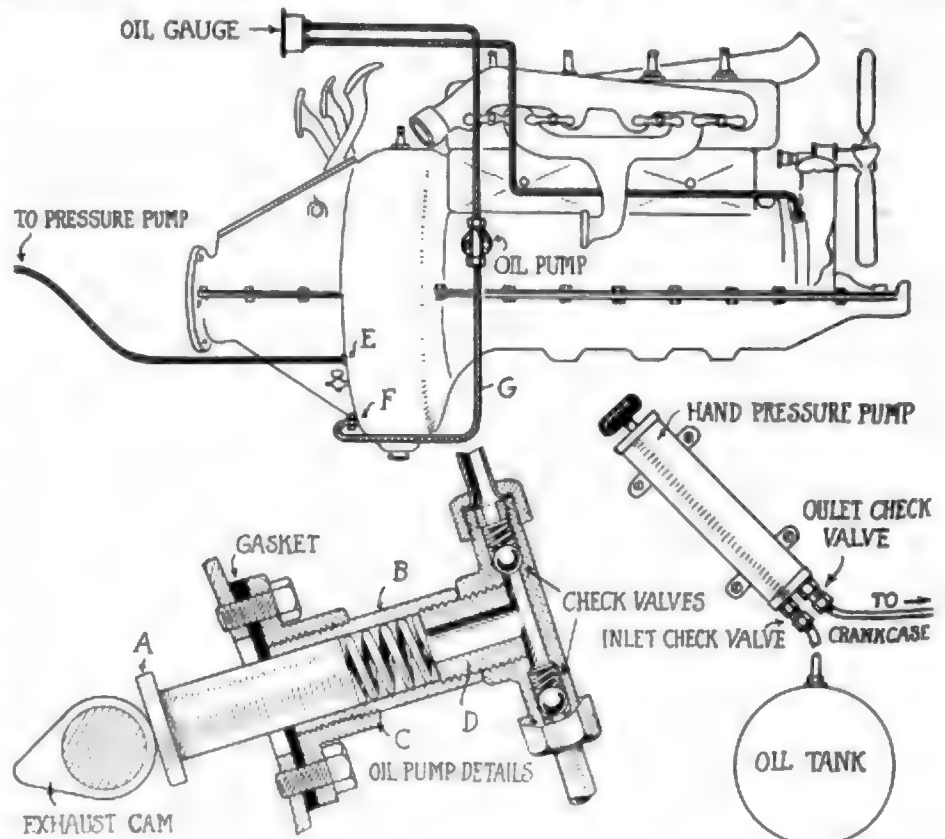


Fig. 1—Oiling system as auxiliary unit for Ford engine. Such a system is necessary for high-speed work

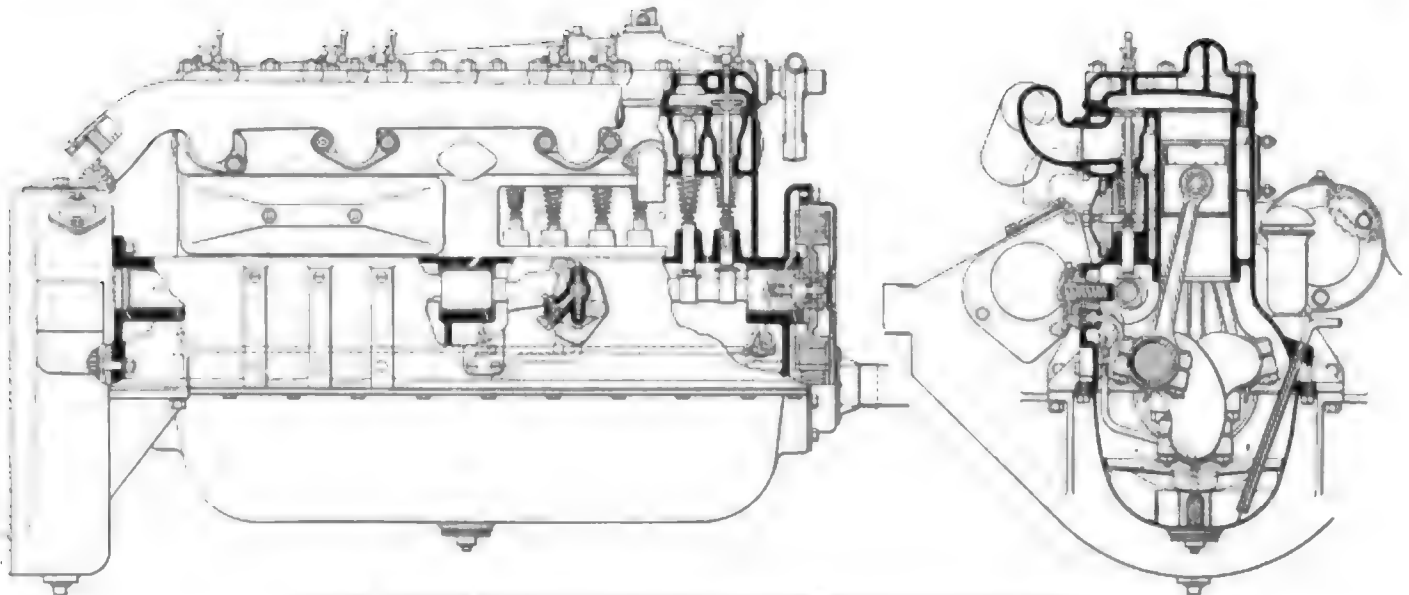


Fig. 2—Sectional drawings of Continental engine published upon request of reader

in diameter than the present ones and be on the safe side.

CANNOT COUNTERBALANCE A FORD No Satisfactory Method of Rebuilding Crankshaft

Hampton, Iowa.—Editor Motor Age—We wish the following information in regard to rebuilding a Ford:

- 1—Would Ford high-speed clutch be suitable to use with a three-speed selective gearbox?
- 2—Can you give method of counterbalancing a Ford crankshaft, which can be done in an ordinary machine shop?
- 3—Is it advisable to remove magnets and replace with non-magnetic material?
- 4—How much do magnets retard speed and power of motor?—Sikkema Auto Co.

1—It could be used by building a special gearbox throughout to fit it, but the expense would be so much that such alteration would be inadvisable.

2—There is no satisfactory way of counterbalancing a Ford crankshaft.

3—If you have some other form of ignition, yes.

4—To our knowledge it has never been estimated. However, it is enough to pay to remove the magnets if there is another means of igniting.

ELMORE TWO-CYCLE ENGINE MISSES Front Two Cylinders Will Not Fire Properly

Allice, Tex.—Editor Motor Age—We are having some trouble with an Elmore two-cycle engine. Have just installed new rings and rotary valves. It is in good condition, but we cannot make the two front cylinders fire, although the two rear cylinders work perfectly. Ignition is by Atwater Kent and K. W. high tension magneto and seems to be all right. The engine has a two-way gas intake manifold. It doesn't seem to get an explosive mixture to the front cylinders. How can the trouble be remedied?—Lynn Bros. Garage.

If you are sure that all the adjustments such as ignition, carburetion, etc., are correct, and that the two front cylinders have good compression, there is a possibility that the pistons in these cylinders were turned around in assembling the engine so that the baffle plates on top of the pistons are opposite the exhaust ports, whereas they should be opposite the intake ports.

This would allow the incoming charge of gas to rush across the top of the pistons and out of the exhaust ports. The function of the baffle plates on the pistons is to deflect the incoming charge of gas to the top of the cylinder, where it is compressed, fired, and the burnt charge expelled through the exhaust ports uncovered by the pistons when the latter reach the bottom of their stroke. The proper placement of the piston in the cylinder as regards the baffle plate is shown in Fig. 3. The fact that the two rear cylinders fire properly would indicate that the rotary valve sleeve has been put in properly. We would also suggest that you look carefully for leaks in the crankcase and where the intake manifold connects to the engine. It would also be advisable to go over the ignition system again and see that the cables leading to the front plugs are connected properly so that the firing order is correct. Also test for a spark at these cables and plugs, to make sure that the ignition system is in order.

Intermittent Firing on Ford

Drumright, Okla.—Editor Motor Age—What is the cause of intermittent misfiring in a Ford engine? The engine runs perfectly while idling and when speeded up to about 15 m.p.h. I have tried two sets of plugs of different make, new coils, coil boxes, wirings, commutators, carburetors, gaskets and cleaned out all parts. The timing of the en-

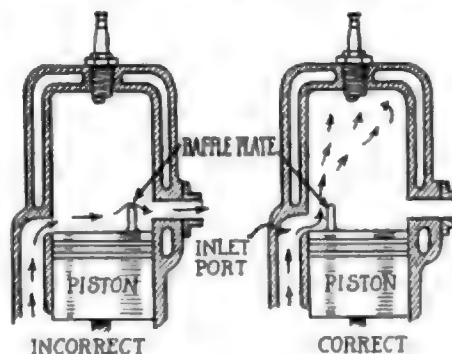


Fig. 3—Probable reason for miss in Elmore two-cycle engine. If the pistons are reversed the engine will not fire correctly

gine is correct. When throttled down to where missing begins, by pressing the foot on the pedal and speeding the engine to labor it will begin firing regularly again. When throttled down lower to where it ought to idle reasonably, it stops completely as though the switch were off.—Bob Brown.

It would appear that the magneto magnets are weak. The remedy is to install new magnets or have the present ones recharged.

GREASE EXITS AROUND WHEELS Unusual Trouble in Maxwell Lubricating System

Winchester, Ill.—Editor Motor Age—Why does grease persist in working out around the left rear brake drum on my 1916 model 23 Maxwell? I have cleaned it and have proper amount of grease in differential.

2—Is there any way a 6-volt battery could be used instead of a 12-volt?

3—Will the life of my tires, 30 by 3 1/4, be materially shortened if I drop the pressure down to 55 lbs.?—C. M. Smithson.

1—This case is very rare and in practically every case where reported has been traced to the use of too much oil or grease in the differential, or too much grease in the hub cap. The rear-wheel bearing is lubricated from the grease which is placed in the hub cap, and if the cap is removed, filled with grease and screwed back on too frequently there is danger of forcing the grease out around the brake drum. It is barely possible that the rear wheel felt washer needs renewing, although we believe the trouble is entirely due to too much grease, either in the wheel or in the differential.

2—No.

3—Yes. You should keep the pressure up to the recommended figure.

Working Parts of Engine

Forest, Ind.—Editor Motor Age—Give diagram of working parts of 7 W. Continental motor.—Pearl Knight.

Side and front cut-away views of this engine are shown in Fig. 2.

Hupp Has Carbon Knock

Dilly, Wis.—Editor Motor Age—My Hupmobile Series N is equipped with the Atwater Kent system. In going up a grade when the engine starts to labor there is a sort of metallic knock which increases in volume with the speed. It seems to be in the

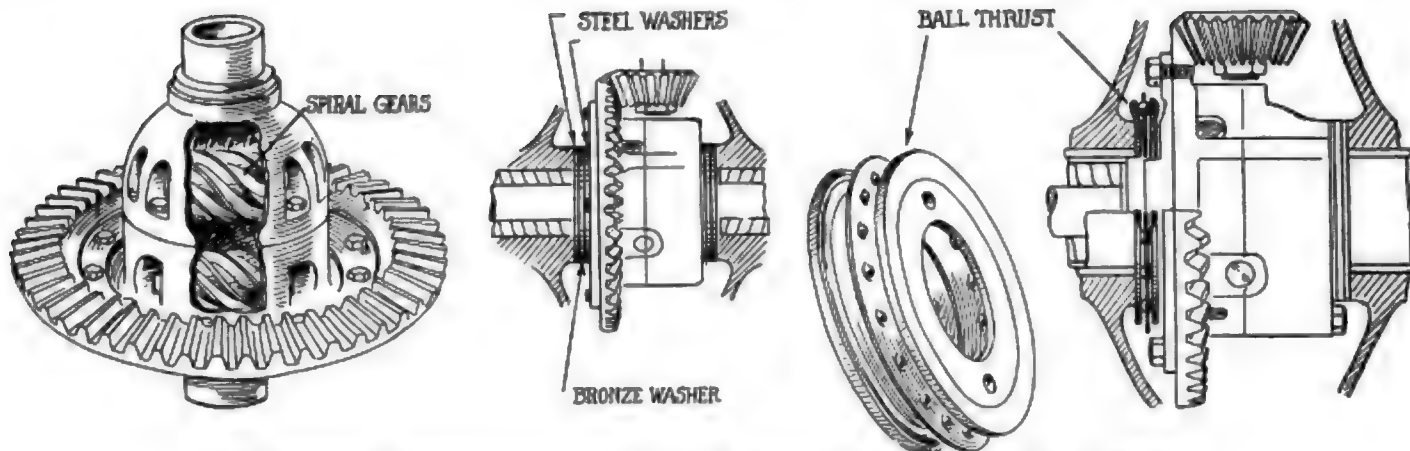


Fig. 4—Diagrams to show operating principle of M. & S. differential and installation of Bailey ball thrust

ignition and not in the bearings. What is the cause and the remedy?—Albin Picha.

This knock is due to carbon, or possibly to carrying the spark advanced too far. You should retard the spark when the engine is pulling slowly in ascending a hill and, furthermore, you should shift gears before the engine starts to labor if you wish to preserve your car as long as possible. It would be well, however, if the knock is pronounced, to have the carbon cleaned out without delay.

SOMETHING ABOUT PISTON STOOK

Action of Aluminum Alloy and Advantages of Use

Detroit, Mich.—Editor *MOTOR AGE*—What lightweight piston can be fitted as snug as cast iron? I have tried the so-called Magnalite and they have to be too loose for ordinary work, but for speed it is different, as I could run along 35 m.p.h. and better with the light pistons than 23 m.p.h. with the original iron ones, but with slow driving they pumped oil and lost compression.

2—Does the M. & S. gearless differential save power?

3—What size balls and retainers are used in Ford rear axles to relieve side friction?

4—What carburetor is best for general use for Ford cars, for speed up to 60 m.p.h.?—F. LeDixon.

1—Aluminum-alloy pistons are never fitted as tight as the cast-iron pistons. The usual clearance in a cast-iron piston of the average motor car engine is about .002 or .003 in., while an aluminum-alloy piston of the same diameter would probably have a clearance anywhere from .004 to .005 in. The expansion of the cast-iron pistons is not so great as that of the alloy pistons and can therefore be fitted much more closely than the latter. Where speed is the important factor, the "sloppy" fit of the alloy pistons can in most cases be ignored, because when the engine starts to get hot the clearance between the pistons and cylinder walls will be diminished. The manufacturers of aluminum-alloy pistons claim greater reciprocating motion, quicker accelerating, and among other things less vibration with these pistons. Very good results have been obtained by fitting lightweight gray iron pistons in engines where speed conditions are normal. These particular pistons can be fitted quite snugly in the cylinders.

2—According to the maker, this differential will pull a greater load than the usual

type of bevel-gear differential, provided the power of the engine is applied evenly to both rear wheels. This differential is not of the gearless kind, however, for there is the same number of gears found in it as in the ordinary bevel gear type. The difference is in the gears. In the ordinary type there is a bevel gear attached to the inner end of each axle shaft which meshes with three or four smaller pinions carried on a spider. In the M. & S. spiral gear differential the gears which fasten to the axle shafts are of the spiral type cut on an angle of 45 deg. These gears mesh with four other spiral gears which correspond to the four bevel gears in the spider differential. They are placed as shown in Fig. 4.

3—There is no ball thrust on the Ford rear axle to relieve the side pressure. The only provision made to take the thrust is the placing of three large washers back of the ring gear on the left side and also on the right side of the differential housing. When in position the bronze washers are between the two steel washers, as shown in Fig. 4. The washers on the right side of the differential housing have only a

slight wheel thrust to take occasionally and consequently do not wear greatly, while those on the ring gear side have to take the thrust of the drive as well as that occasioned at times by the road wheel. The result is that these washers need replacing frequently to insure a proper action of the drive pinion and ring gear. When the washers wear thin the ring gear slips away from the drive pinion and the drive is taken on the weakest part of the teeth of each gear. The result is that the teeth are often stripped, unless the washers are replaced. A loud humming noise in the rear axle housing is usually caused by improper meshing of the drive pinion and ring gear. The Bailey ball thrust is designed to replace the flat washers on the left side of the Ford differential, and accompanying illustration shows how it is installed. It is made of heat-treated steel and has eighteen $\frac{1}{4}$ in. steel balls held in a retainer. According to the maker of this device, it has a capacity of six times the maximum thrust, due to the fact that the large diameter is made necessary in order to get proper clearance, as the illustration will show.

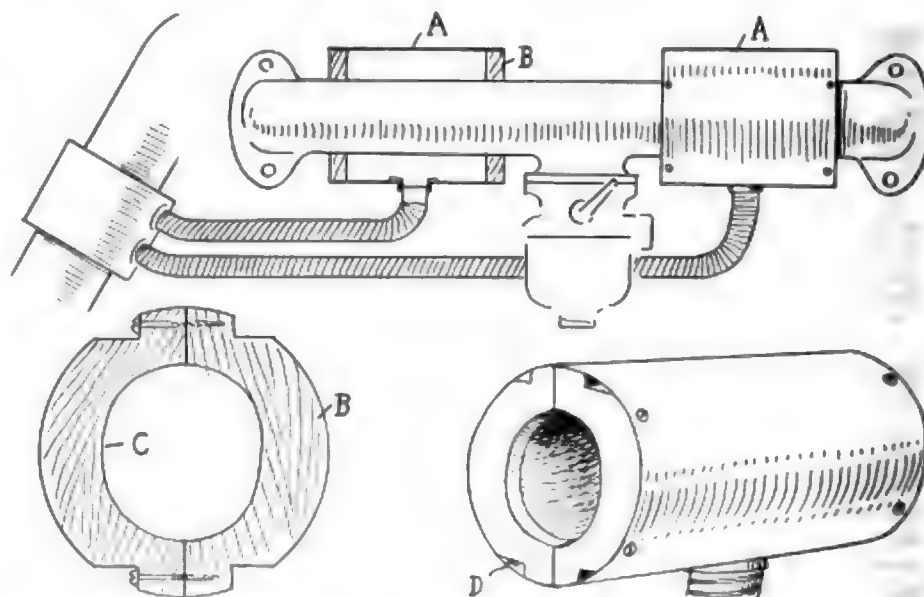


Fig. 5—Installation which may be applied to carburetion system of old Packard to take care of present low-grade gasoline

4—Any of the modern carburetors will give good results with the Ford engine, providing the installation is properly made. This applies when the engine is used for general work, but for speed purposes it is a good plan to fit a little larger carburetor. The latter alone will not, however, give you a speed of 60 m.p.h., for it will be necessary to change the gear ratio to about 3 to 1, put in slightly larger valves, and alter the engine in various other ways as demanded by the increase in speed.

TIMING DIAGRAM FOR VELLIE 1915 Method of Resetting Ignition on This Model

Blandinsville, Ill.—Editor MOTOR AGE—Give diagram of timing, or way to reset timing on a Vellie 1915 model, large six with a Continental engine and automatic Atwater-Kent system. Illustrate markings on flywheel. The points have been dressed off several times, which I think has affected the ignition, causing the engine to heat, as all other working parts of motor are O. K.—T. V. Argenbright.

A diagram of the valve timing and with the marking on the flywheel, with which you can take the timing of the camshaft and valves is shown in Fig. 6.

In resetting the ignition, if this is thought to be the difficulty, set the engine with No. 1 cylinder at upper dead center and with the distributor arm on contact No. 1 of the Atwater Kent system. Then loosen the short rod which is attached to the Atwater Kent arm and revolve the head slowly until the breaker clicks, and without moving the hood attach the rod to the arm and adjust the lock nuts to hold it in its position. Individual engines sometimes require a little different adjustment, but this can be determined only by trial. If the engine pounds on a hard pull retard the spark a little. On the other hand, if it seems a little sluggish you can advance the ignition from this point to a point where it will not pound while pulling.

Genemotor Not for Buick

Poteau, Okla.—Editor MOTOR AGE—Advise best way of connecting a Genemotor to a Buick, model 29 car.

2—Is it advisable to cut teeth in flywheel

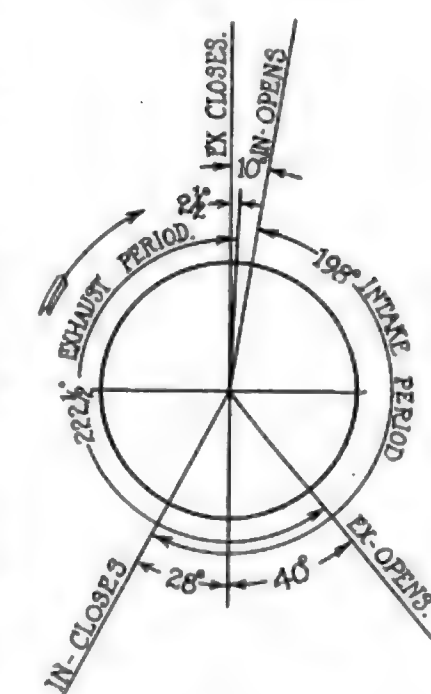


Fig. 6—Diagram to assist in timing of 1915 Vellie

and use shifting pinion to start on, then use silent chain drive to generate—and about what ratio in both instances?—Ben Curtia.

The makers of this system have never made such an installation and advise that it would be a rather difficult case of fitting.

It would be necessary to construct new brackets and use different sprockets and chain in order to procure the proper drive ratio of the Genemotor.

2—We do not know of any way in which the Genemotor could be attached so that the pull would be exerted on the flywheel direct, i. e., the cutting of teeth in the flywheel.

Ammeter on Little Six

Clinton, Wis.—Editor MOTOR AGE—Show how an ammeter can be attached to show the generator output and battery charge and discharge on the Little six, 1915, made by the Little Motor Car Co., Flint, Mich. It has a

Dyneto generator with no starting motor.

2—Can an ammeter be attached to a Jeffery 463 in addition to its present equipment, and how?—William A. Mayhew, Jr.

1—Published in Fig. 7 is a diagram showing how to connect an ammeter to this system.

2—A 30-030 ammeter can be attached to the model 462 by simply removing one wire from the present gage and running it to one connection on the ammeter, then insert a wire between the remaining connection and the connection on the present gage from which the wire was removed.

HEATING OLD PACKARD MANIFOLD Suggested Method of Modernizing Gas System

Belleville, Ill.—Editor MOTOR AGE—I would like to install some means of heating the intake manifold on a 1912 Packard. Would it be practicable and effective to wind soft copper tubing about the manifold which was connected to the exhaust, for the purpose of heating the manifold and the incoming charge of gas?—C. P. Hamill.

A suggested scheme for this is shown in Fig. 5 and consists of two cylinders of sheet metal A fastened to suitable shaped end pieces B made of wood. The latter are made as shown and held together by round headed screws after they have been slipped on the manifold. The opening C in these pieces should be cut a little scant so that the screws will draw the two pieces tightly together and hold them quite firmly upon the manifold. After the four end pieces are in place the metal cylinders A can be slipped in place and fastened to the wood pieces by small screws. A hole is made in the bottom of each cylinder before they are put in place and flexible metal tubing attached to them. This tubing can be about 1 in. in diameter and is the same kind used ordinarily for supplying hot air to the air intake of the carburetor. The other ends of the tubing are attached to hot air stoves clamped around the exhaust pipe. To make a neat looking job the whole device can be painted black, using an engine enamel. The small openings D caused by notching out the wood pieces can be stuffed with asbestos yarn to make them tight.

OPERATION OF CUTOUT ON DELCO Cadillac System Explained—Remedies for Troubles

Centerville, S. D.—Editor MOTOR AGE—What is the cause and cure for an automatic cutout sticking and not working properly on a 1914 model Cadillac? The cutout sticks and when the car is stopped the generator runs backwards and runs down the battery.—Orrin Raddock.

The trouble is in the adjustment and general condition of the cutout. We will give a complete description, together with methods of adjusting, so that you can give the device a general overhauling. Refer to Fig. 8.

The cutout relay consists of a set of contacts that are held open by spring tension, and closed by an electro-magnet which overcomes the tension of the spring. They should be open when the engine is at rest. The electro-magnet has a compound winding consisting of a voltage coil of many

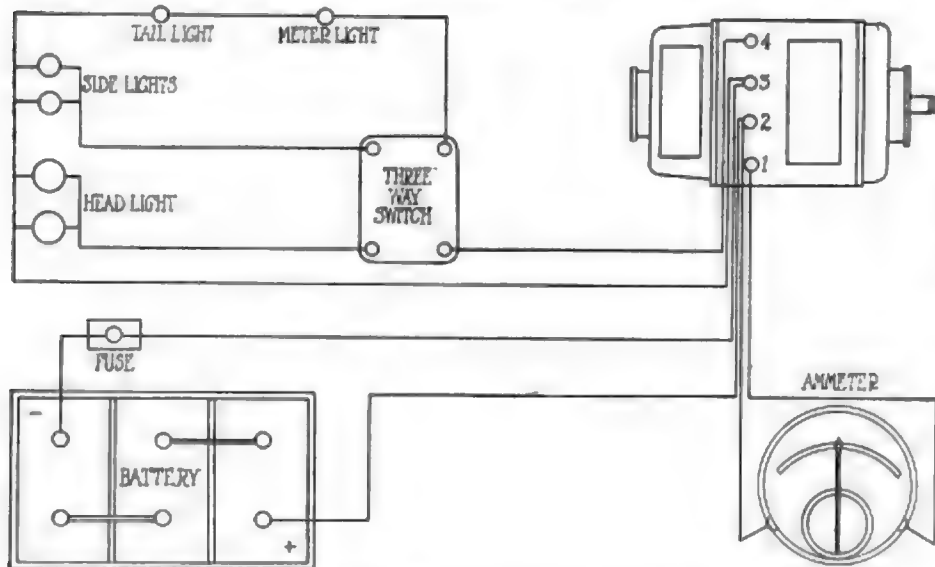


Fig. 7—Diagram to show method of connecting ammeter to Little six

taking the lead from the dash the lead should be taken from the tail-light terminal as shown by dotted lines in the drawing.

ADJUSTING CLUTCH OF 1916 VELLIE Can Get at Screws by Removing Hand-Hole Plate

San Antonio, Tex.—Editor MOTOR AGE—How can I adjust the clutch for high speed in a 1916 Vellie touring car? With the clutch or gearshift lever in the high speed notch, the car will not travel in proportion to engine speed.—J. A. Just.

To adjust the clutch on this car the hand-hole plate on the flywheel housing must be removed by taking out the four screws which hold it in place. This will expose two set screws or studs to view, located at diametrically opposite points on the clutch. These can be located by turning the engine over slowly until one of the studs comes to the top. Give each stud a half turn to the right, after having first depressed the clutch pedal to throw out the clutch. The car can now be taken out on the road to see if the trouble has been remedied. If the clutch still slips it will be necessary to give the adjusting screws another half turn or so. It may be that the clutch plates have become gummed with oil and in this case kerosene should be squirted in the clutch by means of a squirt gun. There is a plug in the bottom of the clutch housing which should be removed when the car is in operation, as the excess oil and grease will find its way out of the housing and not get into the clutch.

HAYNES LOSES POWER ON PULL When to Change Oil in Gearbox and Differential

Jewell City, Kan.—Editor MOTOR AGE—My 1917 model 36 Haynes seemed to lose power or hesitate on a quick pull. I ground the valves and found the stems badly carboned for an inch or more. Is this a common occurrence in this engine and what will prevent it?

2—How often should the oil in gearbox and differential be changed as to number of miles?

3—The regular tire equipment is 34 by 4. Would an oversize 36 by 4½ make for greater power or speed?

4—The right headlight does not burn brightly, although I have tried different bulbs, and all connections are tight. Where does the trouble lie?—F. V. Kreamer.

1—It is possible that the air valve on the carburetor of this car is stuck at times and does not operate properly, thereby causing excessive carbon to accumulate in the combustion chamber, or it may be that the valve timing is incorrect, thereby allowing the valves to be in a raised position when the different cylinders fire, which

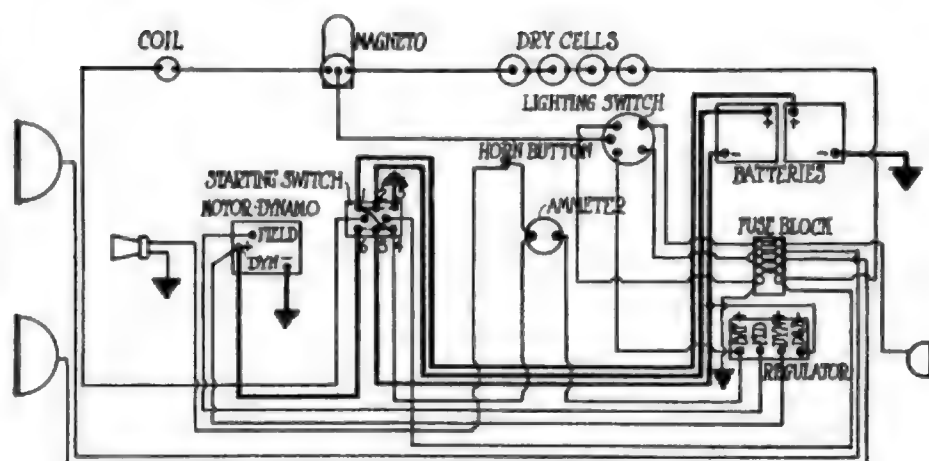


Fig. 10—Wiring of Simms-Huff system as used on 1915 Maxwell 25

would of course account for the carbon accumulation on the valve tappets, although a person could of course expect to find a reasonable amount of accumulation even under the best motor operating conditions. The carbon on the valve stem, as long as it does not cause sticking, is in itself, of no consequence.

2—The gearbox should be drained approximately once every 4000 miles and cleaned thoroughly with kerosene. This is also the approximate mileage at which the differential should be drained.

3—No. Greater comfort to passengers and greater tire mileage would result.

4—It is focused incorrectly. The bulb and its holder can be moved back and forth. Place the car about 50 ft. from a wall, turn off the left bulb and move the right bulb back and forth until the best light is obtained.

ZENITH CARBURETOR ON A HUPP Idling Adjustment Is One Reader Refers To

Peebles, Wis.—Editor MOTOR AGE—Do bulbs consume more current when they become old or slightly black?

2—There is only one adjustment on my Zenith carburetor. Which way should I turn the knurled screw to get a rich mixture?

3—is the Zenith carburetor considered superior or as good as the Rayfield carburetor?

4—Does the Spartan motor driven horn consume more current than the vibrator type horn?—Ellis C. Johnson.

1—We do not believe that used bulbs will consume any more current than new ones, but of course the quality of light secured from the same amount of current consumed is very much inferior.

2—The adjustment of the Zenith carburetor to which you refer is only for idling. This is merely to secure a smooth running engine in idling position and when the small knurled nut with its skirt attached is screwed up, or to the left, while looking down on the nut, the quantity of air is decreased.

3—One of the big features of the Zenith carburetor is its automatic action. It is immune from the various ills caused from the fact that the average garage man will attempt immediately to adjust the carburetor for almost any ill which may occur. The adjustment of the Zenith carburetor is obtained by installing smaller or larger jets or a compensating jet. These jets are carried in stock by Hupmobile dealers or Zenith carburetor branches. We do not, of course, wish to bring out any particular comparison in equipment, but would advise that the Hupmobile engineering department has found the Zenith carburetor to be the best under all conditions for the Hupmobile, and we, therefore, advise that this carburetor only be used.

4—The Hupp company has not, at any time, used the Spartan or a motor-driven horn, but would advise that the vibrator horn used will draw about 1½ amp.

1915 Maxwell Wiring

Osage, Iowa.—Editor MOTOR AGE—Furnish a wiring diagram for the Simms-Huff starter and generator as used on a 1915 Maxwell 25 car, showing how all connections are made for starting and lighting.—A. J. Evans.

The wiring diagram is shown in Fig. 10.

Oil Leak in Buick

Troy, Ala.—Editor MOTOR AGE—There is an oil leak in the crankcase of my Buick D-45. I am unable to keep the oil above the level of the pet cock gage, as it will leak, no matter how often I fill. I have had a new washer put in around the pet cock gage; also a new bushing around the crankshaft at the timing gears in front. A small amount of heavy oil still leaks out at the front, but the main leakage is in the dust pan and runs out at the rear and this is motor oil from the crankcase. I have been able to get only around 30 ml. to the quart, while others are getting 250.—George Rainer.

We would suggest that you examine carefully the drain plug in the bottom of the lower crankcase, the joint between the upper and lower halves and the joint between the lower half of the crankcase and the timing gear housing.

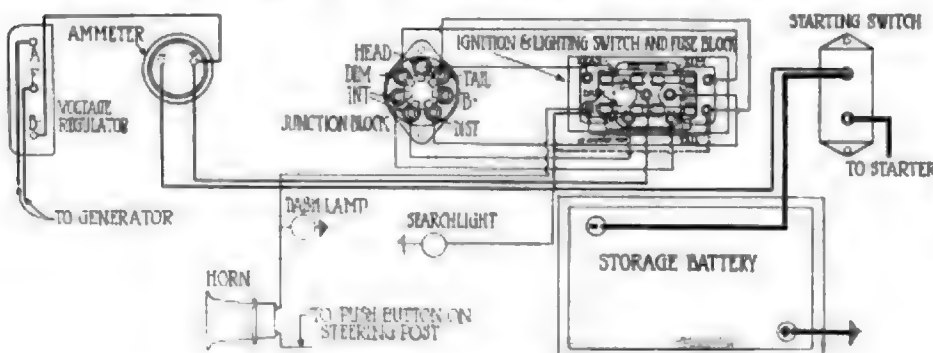


Fig. 11—Wiring of 1916 Case 40 showing method of connecting spotlight



From the Four Winds



FENCING SANTA ANA OFF THE ROAD—Santa Ana is a wind. It blows so unceasingly and hard motorists in California have a hard life on the Foothill boulevard. The board fence is necessary to keep the sand from drowning the boulevard. It is set at an angle and weighted with bags of cement.

NEW Highways to Be Wide—Under the new road improvement act, which provides for \$15,000,000 worth of paved roads in New Jersey, the width of the highways has been set at 30 ft., with an 18-ft. pavement.

Park Gives Camping Sites—Motorists passing through Arbuckle, Cal., this season will find excellent camping grounds at the Balfour Park. The chamber of Commerce has thrown the park open as a camping place. Water has been piped to the park and camp shelters have been erected.

Texas Road Work Hampered—Officials throughout this state are afraid the war will hamper road work, for the reason that road bonds cannot be readily disposed of. Many bond issues, voted within the last few months, and there have been more than ever before for the same length of time, are unsold.

Wisconsin Sees New License Record—Wisconsin is practically certain of breaking all previous records for registrations, the total of which at the middle of May was in excess of 118,000, compared with 61,000 at the same date a year ago. The entire registration by private owners during 1916 was 116,000. For 1917 it is expected to exceed 175,000 at the present rate.

New Commissioner for Connecticut—Connecticut now has a new motor vehicle law and a commissioner to handle the department. Robbins B. Stoeckel is the commissioner and he has appointed John MacDonald as his deputy. The new law has a lot of extracts from the old law, but there are some new sections relating to operation, penalties, etc. The commercial vehicle fees have been increased, but the passenger car registrations are still 50 cents per horsepower. Some limitations have been placed upon the dealers, and the non-residents are not limited to any specific number of days.

The motor vehicle commissioner has broad powers to suspend licenses and give hearings, but any motorist may appeal from his decision to the judge of a superior court.

Long Tour on Silver Wedding—Mr. and Mrs. O. E. Aultman and son, of Denver, are making an extensive tour of the country in their Velle. It is Mr. and Mrs. Aultman's silver honeymoon. They decided years ago to make a long tour this year, and they have already covered 3,600 miles.

Overland Makes Western Coast Record—An Overland driven by L. J. Kearns, sales manager of the Overland-Pacific branch in Seattle, Wash., has set a new high mark on the Seattle-Portland highway. With an actual running time between Puget Sound and the Columbia river of 5 hrs. and 9 mins., the Overland established a record of 196.1 miles.

Fire Car Celebrates Fifth Year—Marathon Kate has celebrated her fifth year in the service of the Grand Rapids, Mich., fire department. The name is explained by precedent. Fire Marshal George Boughner used to have an official horse instead of an official car, and this was the horse's name. Not only has the car, a Jackson, transplanted the horse, but it has retained the name. Marathon Kate has driven to 30,000 miles of fires.

Western Washington Motorists Organize—The Automobile Club of Western Washington has been formed. It is to include every motor club in the counties west of the Columbia river. The individual clubs will be absorbed by this new organization, which it is hoped will have a membership of more than 10,000. Its activities will be devoted primarily to the promotion and encouragement of good roads. Signs will be erected on the main and scenic highways; road maps will be issued and touring information given out. The headquarters will be in

Seattle. Information bureaus will be conducted in each of the cities of western Washington where more than 100 members are located.

New York Cars at Fashion Show—A motor fashion show will be held at the Sheepshead Bay speedway June 23 in behalf of the Actors' Fund of America. Prizes will be awarded by a jury composed of newspaper men to the most fashionable combination of car and entrant. Entries are to be limited to 100.

St. Louis Rounds Up Motorists—Sixty-four motor car drivers were fined \$5 and costs at St. Louis one day as a result of a round-up by the police department's flying squadron in the West End. Of the arrests, forty-five had no tail-lights, five had dazzling headlights, four had no lights and ten were speeders.

Oregon Provides Camp for Motorists—A free camping park for motorists has been established at Husum, Ore., on the White Salmon river. Stone fireplaces have been arranged for cooking, and free fuel will be supplied. Parking facilities for cars under cover or adjacent to the park, also have been arranged.

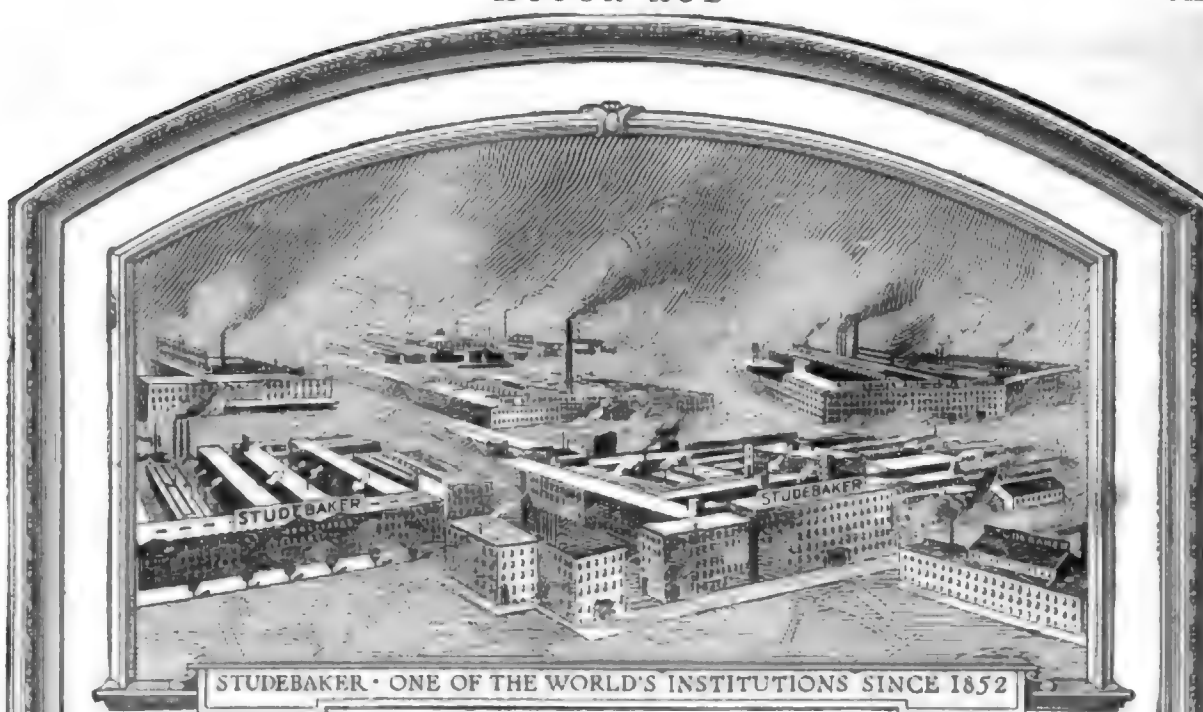
Michigan Shows Used Cars—The first used car show ever held in the Upper Peninsula of Michigan was at Calumet, Mich., May 15-17. About 100 cars were exhibited and sales were satisfactory. The show was managed by Copper county dealers, and admission was free. An auction was held once a day.

License Fee to Repair Roads—The \$1.-\$500,000 received during 1917 by the New Jersey motor vehicle department for registrations, fees, fines, etc., will be apportioned out to the twenty-one counties for road repairs. Next year this fund will be used for construction of new roads. A patrol system will cover all improved roads of the state as soon as the new construction has been finished.

Bay State A. A. Plans Run—The board of directors of the Bay State A. A. has voted to hold its annual outing as usual this year and to call it "The Prosperity Run." It will take place June 16, 17 and 18, and the motorists will go from Boston to the Farragut House at Rye Beach, where they will have a ball, outdoor sports and banquet. Officers of clubs in other cities have been invited to join in the run.

Motorists Prepare Camping Site—About fifty motorists gathered at the new tourists' park on Feather river, Oroville, Cal., May 5 to assist in preparing the park for the summer tourists. Roads leading to the park have been put in condition, and carpenters have been busy building camping shelters. Water has been piped to the park, and it is claimed that the camp is one of the finest on the Pacific coast.

Denver Prepares for Another Show—A big motor show some time within the next year is now assured Denver by unanimous vote and active planning of the Automobile Trades Association of Colorado. Whether to hold the event in the fall, as originally planned four months ago, or to postpone it until next winter or spring because there has already been one show here this year, has not yet been decided. A special committee is now investigating the situation. The chairman of the committee is Charles Henry, Jr., manager of the local Ford assembling plant.



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When Writing to Advertisers, Please Mention Motor Age

Urges War Prosperity

Charles M. Schwab Tells World Congress Good Times Must Finance Expenditures

Machines and Agriculture to Decide Outcome; Not Men

DETROIT, June 11—Special telegram—“The war cannot be financed unless we have prosperous times,” said Charles M. Schwab, president of the Bethlehem Steel Co., in the opening address today of the second World's Salesmanship Congress. He made a plea for the aristocracy of industry and deprecated the agitation toward economy which would jeopardize industry. Times must be kept good; in fact, with the big war expenditures to be made here, they cannot help but be good, he said.

“And,” he added, “it is not the rich men who must finance the war. It is the workingman and the middle class man. This morning I have a telegram from the Bethlehem steel plant that more than \$5,000,000 has been subscribed to the Liberty loan by the men in our plant. The officials were barred from this subscription; it was all done by the men, and 80 per cent of those who were suggested as possible subscribers have bought. By next week I will not be surprised if it were 95 or even 100 per cent.

“If there is one thought I wish I could give to you all; to be spread over the whole land, it is the seriousness of this situation. It is not the situation we read about in the newspapers and which does not materialize. It is going to require the active part of everyone in the United States.

Machines and Agriculture

“The war will not be decided by any one great military man. Look back through the history of the war and see how many have appeared thus far. Earl Kitchener told me it would be not a war of men but of machines and agriculture and that the nation that could produce the most machinery and feed its soldiers the best would be the nation that would win the war.

“I have at home an autographed letter from Earl Kitchener in which he said that the organization that produced for Europe 1,000,000 rounds of ammunition a month contributed more to the Allied cause than any other single factor, and this organization we have placed at the disposal of the United States, reckoning not what our profits may be.

“The great leaders of industry, agriculture and home politics are more important figures than the military men, so if, on account of age, you have been denied the privilege of going to the front you may stay at home and help win the

war with the assurance that the glory in the future will be for all.”

In other sections of the congress's sessions it was suggested that the idea of economy is being misunderstood and should be supplanted by the idea of elimination of waste.

The congress opened this morning in the Arcadia auditorium. Departmental sessions were held during the afternoon with a general session this evening at the auditorium, where the remaining meetings of the congress will be held. The last session Thursday evening will be devoted to elections and congress business.

Secretary-Manager D. M. Barrett reported that the congress, which was started a year ago, now embraces 16,000 members in forty-five clubs. By next year he hopes the membership will be 100,000 in more than 100 clubs. St. Louis won the club cup. It has 3,529 members and sent 151 delegates. It wants the 1918 meeting, as does Minneapolis.

At the motor sessions this afternoon an important thought was that dealers must intensify in selling and must plan business readjustments to meet the new conditions, but that there is every reason why business should continue to be good.

C. H. Foster, Cadillac distributor in Chicago, defined service to car owners on Monday and drove home the thought that to make the service department profitable and to eliminate the idea of the customer of trying to get something for nothing it is necessary to treat the service department as a repair and adjusting department. The word “service,” according to Mr. Foster, is a misnomer.

PARMELEE TAXI DRIVERS OUT

Chicago, June 12—Eighty taxicab drivers employed by Frank Parmelee Transfer Co., walked out yesterday afternoon while negotiations were in progress between the company and union officials. The men are seeking an increase in wages from \$70 to \$80 a month and shorter hours. Union officials intimated that the walkout was unauthorized and was instigated by I. W. W.

PULLMAN TO CONTINUE PRODUCT

York, Pa., June 9—The Pullman Motor Car Corp. will continue manufacturing Pullman cars under a contract between the receivers, W. A. Keyworth, C. L. Hoff and Henry Schmidt, and the National Products Co., Newark, N. J. A petition for authority to sell the plant and assets of the Pullman company to the National Products concern has been presented by the receivers, to Judge Whitmer of the U. S. district court, Sunbury, Pa. Purchase of the Pullman company will be approved by the court on June 15, providing no objections are entered by creditors in the meantime. It is stated that the entire organization of the receivers of the Pullman company will be maintained by the National Products Co.

Modify Truck Standard

Quartermaster's Department To Accept Vehicles Most Nearly Like Specifications

No Other Classes to Be Specified for Some Time Yet

WASHINGTON, D. C., June 11—The Quartermaster's Department of the Army, which in May issued specifications for Class A and Class B trucks, not only has decided not to issue specifications for classes of trucks for which bids were opened Sunday as told elsewhere in this issue, other than A and B, but the executives of that department, while not deciding entirely to suspend the first specifications, have modified them to the extent that trucks will be purchased which meet as nearly as possible the requirements of the specifications for A and B classes.

The Quartermaster's Department now realizes it will be impossible to get trucks for army purposes within a year unless concessions are made, although Major Drake of the purchasing bureau of the Department states he has been informed some of the manufacturers will be able to turn out trucks within the year.

Major Drake said the Department is not expecting all of the manufacturers to do this, and it is willing to co-operate with them to the end that the best possible results be secured.

The plan now is to call upon the manufacturers to do the very best possible in the way of expediting delivery to the government, and wherever possible to do so to make such changes from their own specifications, in harmony with the government specifications, as is found possible.

The purchasing officers, therefore, have been given authority to use their best judgment at present in placing orders, while the Department will bend its energies toward having built as soon as possible a military truck which will include in specifications drawn for it the changes which experience in the field with trucks suggests to the government should be made.

Major Drake stated to the representative of MOTOR AGE that he had not received a memorial from a special committee of the N. A. C. C. named recently, with Windsor T. White as chairman, setting forth the fact that it would be impossible to furnish such trucks as called for within a year. However, in view of the action voluntarily taken by the Department, the result sought in the appointment of this special committee seems to have been already brought about.

MECHANICS RUSH TO ENLIST

Washington, D. C., June 11—The motor car factories and the service stations of the country are being drawn upon for

hundreds of mechanics, experienced and comparatively inexperienced, for service in the army both at home and abroad. That thousands of these mechanics will be needed was stated at the War Department. Those who offer their services will enter as enlisted men at \$30 per month. This is in addition to their keep, in other words, their clothing, food, shoes, medical attention and quarters.

They may, if capable, expect reasonably rapid promotion, it being possible for them to go up to the rank of sergeant, which pays \$72 per month. This, also, is velvet, hence, with opportunities for seeing service abroad, the army is proving a drawing card to the motor workers, and a disquieting outlook is in prospect for employers, especially in view of the coming demands for motor cars, trucks, tractors, etc., by the government.

It is possible that, should the situation grow too serious, some plan will be worked out between the government and the employers, that this drain of the forces of workmen may be checked.

Young men, not only from motor car establishments but from colleges and technical schools are enlisting for service in the field ambulance service abroad. In such cases they receive practically no pay. In other words, but a few cents a day, the same as paid privates in the French army. Also, they agree to pay certain of their personal expenses while in the service, putting up bonds for about \$400 each before being accepted, to guarantee these.

The French privates, while getting only a nominal compensation, however, have their families provided for by the government on a sort of pension effective during the service of the head of the family.

PASSENGER CAR USE IN ARMY

Washington, D. C., June 11—Inquiry at the War Department as to the possible use for passenger cars being bought by the government in large numbers, elicited the information that these machines will be needed for the use of officers of the Quartermasters Corps, for messenger service, and in various other ways, especially at the cantonments to be built for the training of the conscripted army. These cantonments will take care of 30,000 men each, and this means a great number of officers for instruction purposes.

STAVER NAMED DREXEL RECEIVER

Chicago, June 12—Harry B. Staver, president of the Staver Carriage Co., was appointed receiver for the Drexel Motor Car Corp. yesterday by Federal Judge Carpenter. Mr. Staver will serve without compensation and his bond has been fixed for \$50,000. The court was advised that a \$12,000 reorganization fund has been raised. Thomas J. McFarland and Mark P. Bransfield, heavy investors in the company, have indicated their willingness to turn over \$500,000 worth of real estate to square up their debts to the company.

Car War Tax 1 Per Cent

Senate Committee Drafts New Section in Revenue Bill; Concurrence Expected

Excess Profits Clause Abrogated—Postage Rates Undetermined

WASHINGTON, D. C., June 11—The Senate committee on finance has finally drafted the section of the war revenue bill under which motor vehicles will be taxed, and it has fixed this tax at 1 per cent, roughly, on the selling price of passenger cars. No tax whatever is provided for on motor cars or trucks used exclusively for business. A total of \$40,000,000 is expected to be raised. Under the schedule agreed upon taxes would be assessed as follows:

Machines originally listed at \$500 or less, \$5; from \$500 to \$750, \$7.50; from \$750 to \$1,000, \$10; and for those of greater value than \$1,000, \$5 for each \$500 above that amount.

A discount of 10 per cent per year from the original list price of each machine would be permitted. Members of the committee express the view that this section will be agreed to on the floor of the Senate, and that the House will also approve it.

The provision in the House Bill for an excess profits tax on manufacturing establishments of 16 per cent has been stricken from the measure. The Senate committee will adopt in lieu of this section a taxing plan similar to the English system.

The committee has yet to reach a decision on the proposed tax on newspaper and magazine advertising or the alternative, an increase in second class postage rates.

National Touring Club

Motorists Form New National Organization

CHICAGO, Ill., June 12—A new motoring organization of national scope to be known as the Touring Club of America had its inception at a meeting of motorists at the Chicago Automobile Club last night. Its object is to further good roads, just and equitable motoring laws and to promote the interests of motoring in general. Last night's meeting, while officially only the organization of the Chicago division, it is anticipated was the beginning of a national organization in which there will be divisions in the more progressive towns and cities throughout the United States.

A set of by-laws was drawn up and officers for the Chicago division elected. William G. Edens is president; William F. Grower, first vice-president; Arnold J. Joerns, second vice-president; Joseph E. Callender, secretary, and Lucius Teter, treasurer. Edens is probably the

most prominent man in good roads work in Illinois, being president of the Associated Good Roads Organization of Cook County and Illinois, president of the National Parks Highway Association, and active in other ways. Joseph E. Callender is secretary and chairman of the Contest Board of the Chicago Automobile Club, and William F. Grower has been in charge of city park and boulevard improvements, in Chicago.

According to the plans of the 100 founders of the new organization who met last night, there is no initiation fee, and dues are \$10 per year. This includes free legal advice, touring information, the Automobile Blue Book, radiator emblem, subscription to the club magazine, etc.

A meeting to complete the organization is scheduled for next Monday evening, and plans for completing the organization of the national body will be worked out then. The headquarters of the Touring Club of America are in premises leased from the Chicago Automobile Club. This whole plan is to be a business organization, without social features.

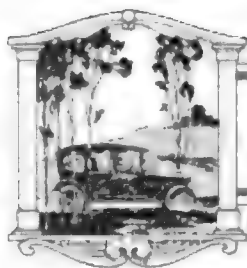
REMYS TO BUILD TRACTOR

Indianapolis, Ind., June 11—The Remy Bros. Tractor Co., which will build a plant at Kokomo, Ind., has been incorporated with a capitalization of \$500,000, all stock being fully subscribed. Frank and Perry Remy, Indianapolis, formerly of Anderson, Ind., where they established the Remy Magneto Co., are the president and secretary-treasurer, respectively, of the new company. Elwood Haynes, president of the Haynes Automobile Company, and A. G. Seiberling, general manager of the Haynes company, are stockholders.

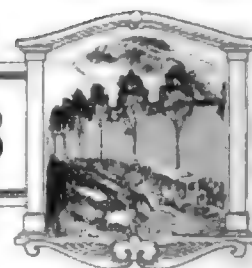
The company now is negotiating for the purchase of a factory site and it is expected that the work of erecting a plant will be started soon. The company intends to place about twenty-five tractors on the market this year, but after the first year production is to be undertaken on a large scale.

CARS LIGHT TRAINING CAMP

Washington, D. C., June 11—The utility of the motor car was demonstrated when the Friars, desiring to do their bit toward making livable the life of men in the army training camps, visited Fort Myer, near Washington, for the purpose of providing an al fresco entertainment for the soldiers. Arriving at Fort Myer, those members of the Friars who made the trip were met with a driving rain which caused a change in plans as the electric light plant at the camp had been put out of commission by an electrical storm. Nothing daunted, two or three motor cars were put into service, their headlights turned on the impromptu stage, and the performance went merrily on.



EDITORIAL PERSPECTIVES



U. S. Needs Truck Drivers

UNCLE Sam is about to buy 70,000 motor trucks, which means that he will have use for that many drivers. Signing up drivers at the rate of 200 a day would require a full year to get this quota. The Chicago branch of the Quartermaster's department has been almost six weeks signing up 200. Whether or not any of those who are drafted into the service among the first half-million will be taken into the Quartermaster's department is not known, but at the rate enlistments are being made it is doubtful if a sufficient number of men could be obtained under the volunteer system to man the vehicles which the Government is about to purchase.

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IF THE draft is applied to the Quartermaster's department it is almost certain that men who have mechanical knowledge will be selected as drivers. France found it necessary to train men as drivers in order that its motor organization, which has been characterized as the backbone of the French forces, might move smoothly. Uncle Sam has not trained many men so far to operate motor vehicles but he may have to in order to get competent men as rapidly as he needs them. Those who have

offered their services in the Quartermaster's Enlisted Reserve Corps have found acceptance the exception rather than the rule. This department has called for practically physically perfect men, of a given minimum and maximum height and weight. This has ruled a large number out whose knowledge of motor mechanics might have made them of service.

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WAR-TIME economy precludes the taking of mechanics from the factories; the men must be obtained from the ranks. The prospective truck driver for Uncle Sam must be proficient in car and truck construction and be able to make his own repairs. The fact that he may be called upon to solve his own problems in emergency is taken into consideration and the applicant has no opportunity to brush up on test questions, for the examination is oral and the examiner may ask any one of several hundred questions that comes to his mind. He does not expect a text-book answer but he expects the answer to be practically correct. A school for truck drivers operated by the Government seems the only solution if the motor fleet of Uncle Sam is not to go begging for drivers.

Army Motor Vehicles

OFFICERS of the Quartermaster's department of the United States army took a wise step—in fact, a necessary one—when they made it known to the motor industry at large that motor truck manufacturers who were asked to bid on the type A and type B army specifications for military chassis would not be required to confine their bids to only such vehicles as conformed to the government's specifications. Soon after the government's specifications for what are popularly termed the 1½-ton and 3-ton military trucks were made public, it became evident that it was a physical impossibility for the manufacturers of commercial vehicles to produce trucks coming up to these specifications in any quantity in less than three or six months' time.

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IF TRUCKS are to be had in quantities in a shorter time than that, the government perforce must accept vehicles which in many respects do not conform to the standard specifications. This was made plain when the bids for the type A and type B vehicles were opened last Sunday. Very few vehicles were promised by the manufacturers to conform with standard specifications in less than three months' time, some bidders even requiring a year to commence delivery. Most of the truck manufacturers who offered to supply trucks made their bids

on vehicles which did not depart greatly from their present commercial production. Many of them, however, supplemented these bids with quotations on the government specification trucks, but instead of specifying immediate to 30-day deliveries, did not promise to begin delivery on the army standard chassis before the first of next year.

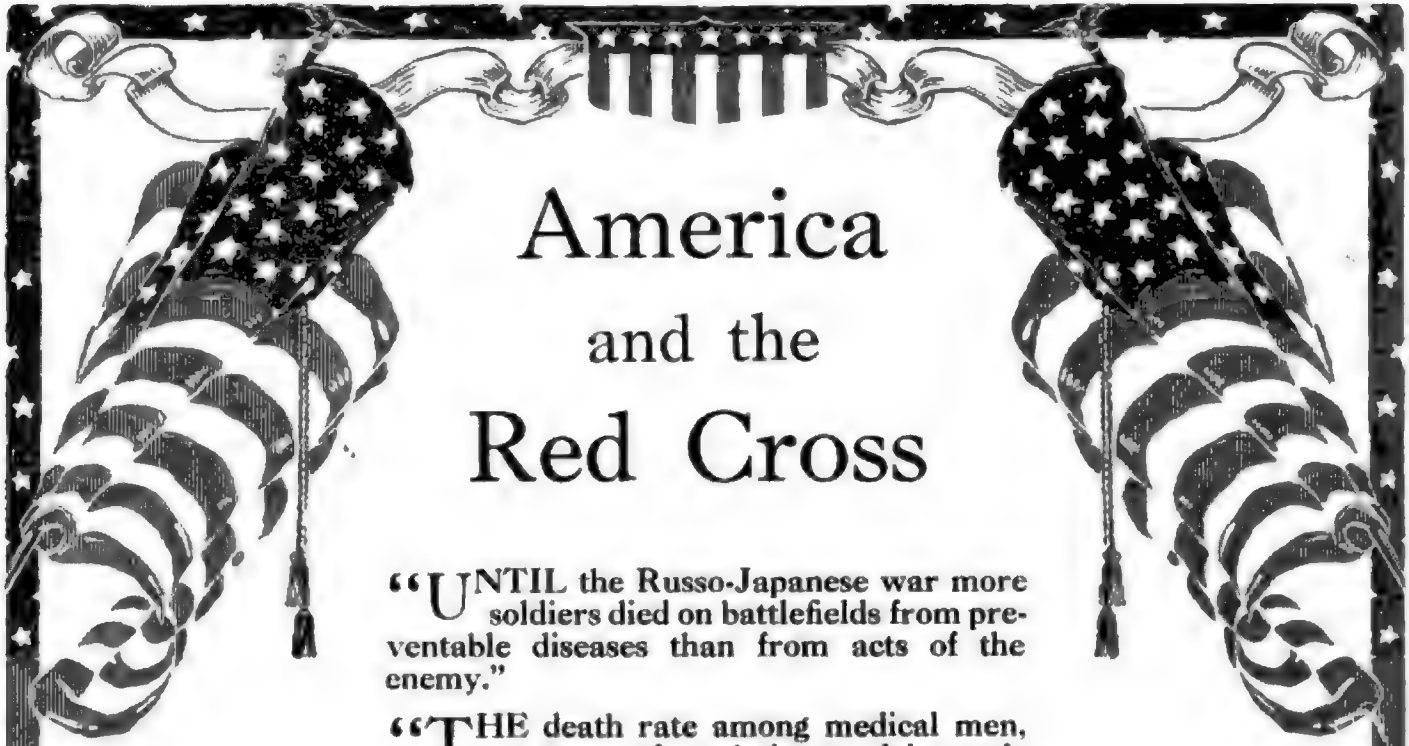
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THE promulgation of standard specifications for army vehicles was a very wise and timely act, for there is nothing that is needed more in military work where large numbers of certain types of products are used, and in which replacements under war conditions will be necessary, than standardization. It was necessary that truck builders in time should be furnishing standard units for military work. On the other hand, the army must be supplied immediately, and while manufacturers are getting tools and materials and parts for the standard chassis, the government can do no better than utilize semi-commercial productions until the standard ones can be had in sufficient quantities. Meanwhile, it is to be assumed that in all probability the standard specifications will be modified in many details both from cost and production standpoints, without seriously decreasing their military effectiveness.

A New National Club

WHETHER or not the new motoring organization which had its birth this week as the Touring Club of America becomes a national force among motorists will depend very much upon how the ends for which it is organized are approached. Certainly, the aims of the new body are worthy of the support of every motorist. It is equally certain that if the national organization is officered by men of the caliber of the officers of the founder chapter, Chicago, it should prove a vital force in furthering the interests of motorists in America, and there is no reason why it should not.

IT MIGHT be thought at first blush that the field of the new organization overlaps to a large extent that of the older and strong American Automobile Association. Proponents of the new club, however, do not feel that their efforts will conflict or overlap those of the A.A.A. inasmuch as such things as contests, and other features which have been the strongest hold of the A.A.A. on American motordom, do not enter into their plans. In fact, it is understood that membership in the new association is to be fostered only through clubs that are part of the American Automobile Association.



America and the Red Cross

“UNTIL the Russo-Japanese war more soldiers died on battlefields from preventable diseases than from acts of the enemy.”

“THE death rate among medical men, nurses and ambulance drivers is greater than in any other branch of the service, not excepting aeronautics.”

DR. FRANKLIN H. MARTIN, in charge of Red Cross work, medicine and sanitation, Council of National Defense, at the Editorial Conference of the Associated Business Papers in Washington recently, gave expression to the two quotations above. In his interpretation of the Red Cross and what it means to the soldier on the field, he said:

“SANITATION and scientific medicine came into its kingdom at the time of the Russo-Japanese conflict. If we fail in one iota to keep up that same standard that was developed in the Japanese-Russian war, and that is now being maintained and has been maintained in the German war from the beginning of the conflict, and that is now being maintained on the western and other fronts, you will know where to place the responsibility.

“WE found that the regular army,” he continued, after telling of the efforts to organize the medical profession, “as it then existed, the militia, contained a very small proportion of the physicians and sanitarians that would be necessary to run an army of 1,000,000. We, therefore, divided the United States into committees. These committees were asked to select the doctors in their state at the rate of one in ten who would best be fitted to serve in case of conflict. These lists were divided into specialists and from these have been selected men who will care for sanitation and medicine in this conflict. We are now planning for the 2,000,000 men who have been called, including those already in service, planning for ten to a thousand.

“THE need is probably greater for medical men than for any other branch of the service. The reason for that is this: England and France, in this great war, have practically depleted their civilian population of medical men. These medical men have gone to the front, have gone into the hospitals, and the waste among the medical men and nurses and ambulance drivers has been far greater than any other branch of the service, not excepting the air service. The reason for that is this, the medical man, the ambulance man, the stretcher bearer must go to the field, he must work, he must continue to work, no matter what the condition of the battle may be, and without very much regard as to where his position in the battlefield may be. In other words, in one recent retreat, 267 doctors were exploded to atoms in one half hour—more than half the number of doctors in our medical service in the whole United States Army and the National Guard at the beginning of this war. These men were in the rear, were coming up, and the land was mined, and they just accidentally came upon this spot and were destroyed almost instantly. As the result of that, 5000 men were lying on the ground for 72 hrs. before they could bring medical men from other parts of divisions.”

THE men in the trenches in Europe need American medical men. There is a dearth of physicians and surgeons in Europe. We, as Americans, owe our generous support to the Red Cross. Those who go to the front as doctors, nurses and ambulance drivers face as great danger as the soldiers in the trenches. We, at home, should give our support so that the work of those on the fields ministering to the wounded can be performed efficiently.

Perlman Monopoly Over?

Dismissal of Suit Against Firestone Indicates Control of Rim Patents Ended

Motion for Decision Was Made by Plaintiff's Counsel

NEW YORK, June 12—Special telegram —One of the most sensational developments in the history of demountable rim patent litigation took place yesterday, when the suit of the Perlman Rim Corp. against the Firestone Tire & Rubber Co., charging infringement of the Perlman demountable rim patent, was dismissed by Judge Hand without prejudice to either party. Motion for dismissal was made by counsel for Perlman.

Dismissal of this suit would appear to indicate that the monopoly of the demountable rim situation under Perlman patents is ended. The decree of the court provides that all exhibits of both parties be impounded and that all testimony taken in case just dismissed shall be available for use in any further litigation between these two parties or their representatives. The future policy of the Perlman Rim Corporation in regard to enforcing patents has not yet been termed. It is understood that L. H. Perlman, president, has retired from all connection with the corporation.

Firestone First Defendant

Firestone was defendant in the first suit brought under Perlman patent, following decision of Circuit Court of Appeals February, 1916, affirming decision of District Court of Aug. 18, 1915, which upheld the validity of the patent and declared it infringed by Standard Welding. Suit against Firestone was brought in February, 1917, in the United States District Court for the southern district of New York. Nothing was brought out in the evidence affecting validity of the patent in any way, although Firestone interests state they had much new evidence ready to introduce when the case was dismissed.

Perlman patent No. 1052270 was issued on application filed June 29, 1906, as a continuation of, and substitute of, application filed May 21, 1906. Perlman's idea, he said, was to patent "a wheel whose demountable rim is bodily detachable from its fixed rim and felloe, means being provided for firmly and rigidly retaining the demountable rim and the fixed rim and felloe while in use, such means at the same time being adapted to be manipulated for enabling ready, rapid and easy removal of the demountable rim when desired." The features are use of separating wedge bolt and nut in connection with short stem lug and the provision of air space between fixed and demountable rims.

Suit was filed by L. H. Perlman against the Standard Welding Co., charging infringement, Oct. 7, 1913, in the United

States District Court for the southern district of New York, and a decision was handed down in Perlman's favor by Judge Hunt Aug. 18, 1915. This decision subsequently was upheld by the United States Circuit Court of Appeals for the second circuit in February, 1916. An injunction prohibiting further manufacture and sale of demountable rims by the Standard Welding was issued March 8, 1916.

The Perlman Corp. was formed soon after this with \$10,000,000 capital, and several manufacturers took out licenses under the Perlman patent. Perlman immediately secured a large plant in Jackson, Mich., which now is producing approximately 4,000 daily.

POSTOFFICE RENTS GARAGE

New York, June 11—The postoffice department here is to run its own garage hereafter. The United States government has agreed to pay \$600,000 rent during the next ten years for a garage to house 250 of its mail trucks. The building probably will cost \$300,000 and will have an available floor space of 67,750 sq. ft. Heretofore the postoffice has maintained its trucks in public garages, and this is the first step towards government ownership of such buildings in New York. It is planned to have government garages in other boroughs in the near future.

TO MAKE PRESSED STEEL PARTS

Allendale, Ohio, June 11—The Postoria Pressed Steel Co. has been organized here for \$100,000 and will make all of the pressed steel parts required by the Allen Motor Co. Officers of the new concern are: Henry Rothrock, president; George E. Kirk, vice-president; E. C. Wolfe, secretary, and C. D. Pifer, treasurer and general manager.

Bijur Loses at Court

NEW YORK, June 11—What probably is the conclusion of the patent infringement litigation between Bijur Motor Lighting Co. and the Eclipse Machine Co., and Vincent-Bendix on the Bendix electric starter drive, was reached to-day when the United States Circuit Court of Appeals upheld the decision of Judge Hazel at Buffalo, last July, which held that the Bendix product does not infringe with the Bijur patent. The case hinged on a claim of Mr. Bendix that he had a contract with the plaintiff to use the patent. He in turn allowed the Eclipse Co. to work under the terms of the contract. The Bijur Co. deny that such a contract existed, but Judge Hazel ruled otherwise.

Bijur took an appeal and to-day's decision is the result. The original case, as well as the present one, attracted much attention on account of the legal talent engaged, which included John B. Stanchfield, George Wickersham, former attorney-general, and E. Henry LaComb, the Thaw counsel, as well as the Chicago firm of Reo, Hibben, Davis and Macauley.

Emerson Will Continue

President States Company Will Produce and Ship Cars Without Reorganization

Receivership of Last Week Only Lasted 48 Hours

NEW YORK, June 12—Special telegram —The Emerson Motors Co., Kingston, N. Y., is not to be re-organized. President Theodore A. Campbell states that the company will continue in operation, that it has plenty of money and will build and ship cars as fast as possible. There are at present about ninety cars assembled and being shipped to dealers. Mr. Campbell says that rumors concerning a re-organization and reduction of capital from \$10,000,000 to \$100,000 are unfounded. The receivership in which the company was placed last week was terminated at end of 48 hrs., following an agreement between stockholders and creditors, because, according to Bainbridge Colby, attorney for the company, the organization is solvent.

CHEVROLET USES LARGER ENGINE

Flint, Mich., June 12—Both the Chevrolet Baby Grand and Royal Mail, touring and roadster respectively, are now equipped with valve-in-the-head engines of 5¼-in. stroke, whereas the stroke previously was 4 in. A water pump, driven off the fan belt has been added and the oil pump which formerly was driven off the camshaft is now gear driven. The powerplant unit has been modified. It now is a combination of amidships and the gearset that is a unit with the engine. An emergency brake lever and an independent service brake pedal are installed, replacing the combination service brake. Clutch lever clearance is considerably greater in the new car. Not much change is noted in body design. A one-man top now is stock equipment and the tire size which was 32 by 3½ now is 33 by 4.

MAKER CHANGES NAME

Muskegon, Mich., June 8—The Universal Valveless Four Cycle Motor Co., Grand Rapids, Mich., has decided to change its name to the Muskegon Engine Co. and has purchased a 40-acre tract of land at Muskegon, on which it will erect a large factory immediately. The general offices, formerly at Grand Rapids, and the engineering department at Toledo, Ohio, have been moved to Muskegon. In addition to the line of engines this company will announce soon a new line of motor trucks of 1- and 2-ton capacity. Preliminary arrangements for the manufacture of these new truck models have been under way for some time.

Ad Motorists Meet Jinx

Only Six of Fourteen San Francisco Cars Reach St. Louis

Tour Chairman Blames Late Winter for Poor Record

ST. LOUIS, Mo., June 11—Six of the fourteen cars that left San Francisco late in May to carry advertising men from that city to St. Louis to the thirteenth annual convention of the Associated Advertising Clubs of the World, last week reached here during that meeting. Eight were last heard from in Colorado. None of the cars traveled the entire distance from San Francisco under its own power.

J. A. Houlihan of San Francisco, tour chairman, said that the first break came at Colfax, Cal., where it was learned that the motor road to Truckee, Cal., a Sierra mountain pass, was under 20 ft. of snow. This necessitated a 55-mile rail shipment for all cars. From that point the Chevrolet pilot car which started six days ahead of the others was driven to St. Louis by R. C. Durant. It reached St. Louis Sunday morning.

At Fort Bridger, Wyo., Houlihan said, a conference of the other drivers was held. They had just driven down a 10 per cent grade on which the mud was so deep that they went on low speed with the throttle wide open. The drivers voted to ship from Carter, Wyo., 9 miles from that point, to Denver, 300 miles. Carter was the nearest railroad station and it required 6 hrs. to get there. Some drivers decided not to ship. Those who shipped were: Studebaker cars, driven by Charles Richman and James Gurley; Buick, driven by Harry Hazelton; Studebaker, driven by Abe Bernstein; Auburn, driven by H. F. Schalldach; Pierce-Arrow, driven by Harry Hamilton. These cars reached St. Louis Sunday night, except the Pierce-Arrow, which arrived Monday night.

F. W. A. Vesper of the Vesper-Buick Auto Co. of this city met the tourists at Plainville, Kan., and piloted them to St. Louis. The cars that were not shipped to Denver were heard from last Wednesday and were still in Colorado, "in a sea of mud," the telegram said.

Houlihan says that the trip was undertaken entirely too early for a season notable for a late winter. Snow, sleet, rains, unworked roads and everything except those things desirable for motor car driving were encountered.

ROAD BOOSTERS TO MEET

Colorado Springs, Colo., June 7—The midsummer gathering of the Pike's Peak Ocean-to-Ocean Highway Association will be held July 10-11 on the summit of Pike's

Peak. Sociability runs are being organized in various sections of the country to attend the meeting as well as to provide an enjoyable summer tour for the delegates and their families. Added interest is given by the knowledge that most of the delegates will drive their cars to the summit over the new Pike's Peak motor road, the highest in the world. This road, a perfect mountain boulevard, 20 ft. wide and safe all along its 18 miles, is said to be one of the most remarkable engineering feats in the last decade.

One of the important matters to come before the delegates will be the report of the committee on western extension of the highway from Utah through Nevada and California to the Pacific Coast. National Secretary A. W. Henderson and members of this committee will attend the Utah Division meeting at Duchesne June 12 and investigate the proposed routes. The roads to be inspected are the Overland trail through Northern Nevada into California, the Midland trail and the Arrowhead trail from Salt Lake City to Los Angeles. The committee will also investigate as to whether an entrance into California other than that of the Lincoln highway or the Midland trail is feasible.

N. Y. DRIVERS MUST REGISTER

New York, June 9—After July 1 all operators of motor vehicles in New York will be required to register and obtain certificates from the Secretary of state to permit them to drive. Governor Whitman has signed the Kelly-Cromwell Bill, which makes this necessary.

Under this measure, which has been opposed vigorously by dealers, owners of cars are placed in a class distinct from those who operate cars for pay, in that they will not be required to undergo an examination. They will receive licenses from the secretary of state to drive upon payment of a \$1 fee.

The measure has been supported by the police department of New York state and long has been urged by the secretary of state. Heretofore, neither the police nor the secretary of state have had power to revoke licenses for flagrant violations of the traffic law. Under the terms of the new measure, those who operate cars while intoxicated will be guilty of a misdemeanor and those who injure pedestrians and fail to report the matter to the police or to surrender themselves will be guilty of a felony, punishable by a fine of \$500 or by imprisonment, not to exceed two years, or both. Convictions for these two offenses must be reported to the secretary of state, and upon a recommendation of the trial court, he may suspend the license of the person convicted and has the power to revoke the license. In the case of third offenders, the secretary of state may revoke licenses and no new licenses can be issued for a period of six months after the date of conviction.

April Exports Fall Off

Cars, Trucks and Parts Shipped From New York Drop \$1,000,000

England Took Only Eleven Cars; Russia None

NEW YORK, June 8—April exports of passenger cars, trucks and parts from the New York port fell off \$1,000,000 in April. The total was \$5,447,996, while in March it was \$6,258,549. Passenger cars showed a small gain over the previous month, numbering 3413, valued at \$2,541,844, compared with 3148, valued at \$2,278,090 in March. Parts declined from \$1,669,115 to \$976,281.

England again was the biggest buyer of trucks, taking \$1,290,594 worth, or 418, which was more than half the total truck exports. The next largest foreign buyer was France, which bought 175 trucks, valued at \$406,266. German submarine activities caused England's truck purchases to drop \$600,000.

Nearly a third of the total foreign purchases of passenger cars went to British South Africa, her total being \$715,599 for 1039 cars. The war has had little effect on the money situation in that district, and the banks have a surplus of money. British South Africa is pre-eminently a mining country like Mexico, approximately 60 per cent of its income being derived from the gold, diamond and coal mines.

Australia continues one of the leading buyers of passenger cars, taking 303, worth \$237,355. England only bought eleven cars, valued at \$30,631. France took seventy-three, valued at \$32,109. Not one car went to Russia from this port.

PACKARD MEN TO CRUISE

Detroit, June 9—Four hundred and fifty Packard factory men, dealers and salesmen will sail June 18 for a cruise to Mackinac Island and thence to Sault Ste. Marie and through the locks a short distance into Lake Superior. Twenty-five passenger car salesmen and an equal number of truck salesmen, who have made high selling marks in the Lincoln Highway Sweepstakes sales contest, will be guests of honor on the cruise, which will last three days. In addition, there will be a complete motor car show on board, and during the cruise an organization convention will be conducted.

CLIFTON AGAIN HEADS N. A. C. C.

New York, June 8—More than ninety companies were represented at the record gathering of manufacturers at which Charles Clifton, head of the Pierce-Arrow Motor Car Co., was re-elected president of the National Automobile Chamber of

Commerce. The other officers elected are: Vice-president, Wilfred C. Leland, Cadillac; division vice-presidents, Hugh Chalmers, Chalmers; Windsor T. White, White, and Herbert H. Rice, Oakland; secretary, R. D. Chapin, Hudson; treasurer, George Pope, and general manager, Alfred Reeves.

The members voted \$30,000 of the organization's funds for Liberty Loan bonds and arranged to carry bonds for all employees who wish to subscribe. The matter of having makers construct their cars so that muffler cut-outs cannot be used except with a screw plug or some other device that can be handled only in a shop was referred to a special committee. The report of the export committee, of which Harry W. Ford, Saxon, is chairman, was made.

John F. Dodge of Dodge Bros., Detroit, was elected to the directorate, the others being Hugh Chalmers; R. D. Chapin; C. W. Churchill, Winton; Charles Clifton; J. Walter Drake, Hupp; C. C. Hanch, Studebaker; Wilfred C. Leland; Alvan Macaulay, Packard; William E. Metzger, Columbia; R. E. Olds, Reo; Carl H. Pelton, Maxwell; H. H. Rice, Oakland; Windsor T. White; and John N. Willys, Overland.

FORD BRANCH IS SUED

Raleigh, N. C., June 8—An anti-trust suit has been brought in this state against the Ford Motor Co.'s branch in this territory. A summary of the charge is that the Ford company is very restrictive in its contracts with its dealers, does not permit them to sell other cars and insists that they handle only such parts as are manufactured by the Ford company. The Ford company's contention is that it insists upon its dealers selling only Ford parts because they are better than the so-called imitation parts.

It is asserted by the Ford company that its various restrictions and regulations are to promote better service to the public and are not designed to stifle competition, it being maintained by the Ford representative that because of the character of the business, Ford has no real competition. There are about 125 Ford dealers in North Carolina, and 85 per cent of them handle the Ford only.

HARROUN READY TO PRODUCE

Detroit, June 9—The Harroun Motors Corp. will be producing complete cars within two weeks. All of the machinery has been installed and materials have been storing up for several months, and the company is now ready to engage in steady output.

OLD LOZIER CREDITORS MEET

Detroit, June 7—Creditors of the original Lozier Motor Co. are to meet Friday at the office of the referee of bankruptcy. Total receipts from the Lozier company amounted to \$1,955,609, of which \$255,715 remains to be paid.

Trucks Aid Somme Gain

Bad Conditions Limit Work of Armored Cars on the Western Front

Motor Vehicles Protect Advance of Tanks from Aircraft

PARIS, France, May 1—Many erroneous impressions have gone out with regard to the work armored cars have been doing on the French front. So far as light armored cars are concerned there has scarcely been a single case of their being used on the Western front, because the ground is so torn up, due to shell fire, that it is impossible for so large a target as a light armored car to share in manuevering work. The protection of such cars is very limited even to the smallest ammunition.

This lack of their use on the Western front can scarcely be considered an indication of their lack of usefulness, however. Rather it must be considered a restriction on their use due to unfavorable conditions.

On the other hand, the motor trucks fitted with anti-aircraft guns have been doing steady consistent work all of the time. These trucks are operating in connection with fleets of tanks, protecting the advance of tanks from hostile airplane observation and control fire. These trucks are also assisting in repair work on tanks. Wherever the tanks are the anti-aircraft trucks are near at hand. These trucks are keeping close up behind the Somme advance.

ADVANCE-RUMELY PLANT BUSY

Battle Creek, Mich., June 11—The Advance-Rumely plant in this city is arranging to manufacture \$2,000,000 worth of oil-pull tractors this year. The force of 400 men now employed in the plant will be doubled.

ALL-STONE INDIANA ROAD

Chicago, June 9—A new route between Chicago and Kokomo, Ind., which eliminates the sand road between the Kankakee flats and Rensselaer now makes it easier for the tourist between Chicago and Indianapolis. This route crosses the Lincoln highway at Dyer. Motorists going to Indianapolis may follow this route as far as Wolcott, going directly south from there over the old sand and dirt road, or follow the stone road direct to Kokomo and thence 50 miles into Indianapolis.

CALIFORNIA ECONOMY TEST

Los Angeles, Cal., June 9—The first motor car contest for the summer season in southern California will be a fuel economy run from this city to Yosemite Valley. June 22 has been selected as the starting date. The contest will be open to Los Angeles dealers only. It is a two day run

to Yosemite and the first night control will be at Fresno. Entries will be divided into three classes, and a silver loving cup will be awarded to the winner in each. The three divisions will be:

1—Four and six-cylinder cars, 1917 models, price \$1,000 or under f. o. b. factory.

2—Four, six or eight-cylinder cars, 1917 model, price not more than \$2,000 nor less than \$1,001, f. o. b. factory.

3—Four, six, eight and twelve-cylinder cars, 1917 model, price \$2,001 and over, f. o. b. factory.

USED CAR SHOW STARTS

Detroit, June 11—The used car show launched by the Detroit Auto Dealers' Association opened Saturday night to large numbers of prospective car owners. Seventeen cars were sold. Sunday morning buyers were on hand at 10 o'clock, when the show opened, and a steady crowd throughout the day produced sales of more than thirty cars.

As fast as the used cars are sold they are replaced with others. All cars have been inspected by a technical committee and are equipped with starters and electric lights. More than 300 are on exhibition. The show will continue for five more days and is open daily from 10 a. m. until 10:30 p. m.

DRIGGS-SEABURY CHANGES TITLE

Sharon, June 9 — The Driggs-Seabury Ordnance Co. has acquired all the property and assets of the Savage Arms Co., Utica, N. Y., and has changed its title to Savage Arms Corp. Though the Driggs-Seabury Ordnance Co., which long has held a prominent place in the motor car industry, thus passes out of existence, it will not by any means cease to be a prominent factor in the industry. The company will continue to furnish drop forgings, frames, axles, transmissions and other parts and is laying plans for large extensions to care for increased business.

HILL JOINS STEAMOTOR STAFF

Detroit, June 9—J. M. Hill has joined the executive staff of the new Steamotor truck Co. of Chicago, organization of which was recently announced in MOTOR AGE. Mr. Hill is widely known in the industry and was at one time the United States commissioner of motor truck transportation for the Panama-Pacific exposition.

APPOINTS TEXAS COMMISSION

Austin, Tex., June 8—The new state highway department will be placed in operation July 1. Governor James E. Ferguson appointed the members of the highway commission a few days ago, Curtis Hancock, Dallas, chairman; T. B. McLean, Mount Pleasant, and H. C. Odle, Meridian. George A. Duren, Corsicana, is state highway engineer.

and Tuesday, June 25 and 26, by securing Lieutenant Amaury de La Grange of the French aviation corps to present a paper on war airplanes, their different kinds and duties, for the afternoon of Tuesday, June 26. Lieutenant de La Grange has been sent to this country by the French government to assist the United States in developing airplanes, etc.

Nothing is more important to-day than airplanes. For the war airplanes are needed more than infantry or cavalry. If the United States could send 10,000 trained aviators with airplanes to the Western front it would be possible to drive the Germans out of the air, and this would be one great step in winning the war. With the present handicap in ocean ships, it would be possible to send airplane engines and aviators in quantities to be effective in France, whereas great numbers of infantry would be difficult to transport. Airplanes are needed to-day more than anything else. They are the eyes of the army. America is going to bend every effort in the next year on airplane production.

It is because of this unusual importance of the airplane that the paper of Lieutenant de La Grange will have a special significance to every S.A.E. member. The lieutenant has agreed to talk frankly on the subject. He has been sent by his government to assist in this work, and he realizes that he will have his most potential audience on June 26. The paper of Lieutenant de La Grange, together with that of Wing Commander Seddon from England should provide a fund of information which S.A.E. members have been long waiting to receive.

ACTION LEAVES REDDEN TRUCK

Detroit, June 7—Leslie R. Action, vice-president and treasurer of the Redden Motor Truck Co., has disposed of all of his interests and retired from the company.

TO ADVERTISE ACCESSORIES

New York, June 9—The Motor Accessories Corp., incorporated in Delaware for \$2,000,000, plans to open two branches in every state in the Union to handle nationally advertised accessories for motor cars and trucks. The corporation will sign up one service station in each town, and there will be a branch in New York and one in Chicago with sub-stations in each city. The first plants will be opened in Newark, N. J., with Philadelphia, Buffalo, Pittsburgh, Brooklyn, New York, Denver, Chicago and Detroit following.

The corporation will operate its own plant in Sandusky, Ohio, manufacturing dry cells, grease guns, air pumps and carburetors. Some of the men behind the organization are R. W. Thompson of Thompson, Warren & Pelgram, attorneys; Henry L. Redfield, Brooklyn, real estate; W. Morris Griscom, Philadelphia; and H. P. Vorkamp, formerly with Mayer Carburetor Co., and the Candler Radiator Co.

Workmen Buying Bonds

Makers Take Millions for Company and Factory Subscription—Employees Aid

Detroit, City of Motor Cars, Takes \$50,000,000

DETROIT, June 9—Workers in the motor car and allied trade factories are responding liberally to the employers' appeals for subscription to the Liberty Bond loan. Canvassing of Ford Motor Co. employees is but half completed and returns show subscriptions of \$2,009,000. An army of workers appealing to fellow employees at the Willys-Overland Co. plant at Toledo yesterday resulted in more than 10,000 subscriptions. Henry Leland, president of the Cadillac Motor Car Co., personally appealed to the employees of that concern, and results from half of the factory display subscriptions totaling \$434,000. The returns at the Packard Motor Car Co. showed that, up to last night, 8350 workers had purchased \$589,500 worth of bonds. The Chalmers Motor Co. announced that its employees' subscription of \$100,000 had been over-sold, and that an additional subscription for \$100,000 was made.

Dodge Bros., holding noon-day meetings, has sold more than \$1,500,000 worth of Liberty Bonds to its employees. More than 950 employees of the Northway Motor Co. purchased \$72,050 worth. Workers at the Fisher Body Corp. increased their subscriptions from \$100,000 to \$150,000. Officials of the Detroit Twists Drill Co. have underwritten \$10,000 for their workers, and the Detroit Lubricator Co. subscribed \$25,000. The Aluminum Castings Co. has taken \$40,000, and the Detroit Steel Spring Co. subscribed \$30,000 worth of bonds for employees.

Detroit has subscribed for \$50,000,000 worth of Liberty Bonds, \$17,000,000 more than its quota.

Makers Buy Liberty Loans

South Bend, Ind., June 11—The Studebaker corporation of this city will take \$1,000,000 worth of Liberty Loan bonds. Half will be thrown open to employees in South Bend, Detroit and branches. If the employees should not take half the corporation will take the balance in addition to the \$500,000 it is holding in reserve for itself.

Detroit, June 8—The Liberty Motor Car Co. is promoting the sale of Liberty bonds in a way of its own. The idea is that of

President Percy Owen and consists of covering the country with reminder cards, which suggest to anyone reading them that it is his duty to buy Liberty bonds. The cards are in two sizes, each having a different message and each to be displayed in a different place. The larger is for store windows and reads: "We Have Bought Liberty Bonds. Have You?" The smaller is for the individual desk and reads: "I have bought a Liberty Bond. Have You?"

Detroit, June 7—Henry Ford personally subscribed to-day to \$5,000,000 worth of Liberty Bonds, and James Couzens subscribed to \$2,000,000 worth. These two subscriptions brought Detroit's total to the point of over subscription by more than \$2,500,000. Dodge Bros. bought \$1,500,000 worth.

MARMON TO VISIT FRANCE

Indianapolis, Ind., June 10—Major Howard C. Marmon has been ordered to France and will depart soon to inspect airplanes in use on the French front with a view to standardizing and co-ordinating the engines of American flyers with those in the French machines. He will be accompanied by a force of workmen and motor experts. It is not expected that Mr. Marmon will remain in France very long. He probably will return at about the time American manufacturers are ready to begin the manufacture of airplanes in large numbers.

TUNING UP FOR CHICAGO

(Concluded from page 14)

Car	Driver
Hudson	Gable
Hudson	Patterson
Hudson	Mulford
Hudson	Vall
Newman-Stutz	Taylor
Newman-Stutz	Taylor
Stutz	Cooper
Mercer	Haines
Mercer	Thomas
Mercer	Unnamed
Frontenac	L. Chevrolet
Frontenac	G. Chevrolet
Frontenac	Boyer
Crawford	M. S. Britt
Crawford	Ewan
Olsen	McBride
Olsen	Unnamed
Johnson	Monahan
Erbs	Burt
Detroit Special	Buzane
Hoskins	Lewis

Prize money will be divided as follows: First, \$8,000; second, \$4,000; third, \$2,000; fourth, \$1,500; fifth, \$1,000; sixth, \$900; seventh, \$800; eighth, \$700; ninth, \$600, and tenth, \$500. In addition the leader at 100 miles will be given \$500 and the leader at 200 miles will be given a like amount. The Champion Ignition Co., Flint, Mich., offers \$350 to the winner if his car is equipped with A-C plugs and \$100 to each finisher A-C equipped.

SEE MOTOR AGE

Issue of June 21

For complete and authentic accounts of Chicago Race, June 16.

French Staff Cars Too Costly

Parliament Charges Reckless Extravagance on Part of Touring Section of Army Officials

PARIS, May 19—Charges of reckless extravagance have been leveled in the French Parliament against the touring car section of the French army. It has been proved that the general headquarters staff ordered twenty-six staff cars at an average cost of \$6,522, being a total expenditure of \$169,572. These cars comprised thirteen Panhard-Levassors at \$6,328 each; four Renaults at \$6,994 each; four De Dion-Boutons at \$6,107 each, and five Delaunay-Bellevilles at \$7,032 each. Each car was fitted up with arm chairs and Pullman couches, electric lighting, Astra headlights, Houdaille suspension, Grouvelle heating apparatus, and special mahogany cabinet-work.

Change Official in Charge

The Parliament evidently considered this unnecessary luxury, for although the House refused to vote the reduction of \$20,000,000 asked for on the estimate, it passed a resolution in favor of \$500,000 reduction. In addition, the general who has been in charge of the motor service of the French army for a year has been replaced by a colonel who previously was in charge of the motor services at the front.

All the charges of extravagance are brought against the use of touring cars, and do not touch the truck or tractor service in any way. There are 14,000 touring cars in the service of the French army; about 11,000 of these are with the armies in the field and the remainder attached to various military services at the rear. It is claimed that the maintenance cost of 1751 touring cars, in service at the rear, for a period of nine months, amounted to \$4,455,792. This works out at an average of \$3,000 a year per car for gasoline, oil and grease, tires and spares only.

In attempting to justify this big expenditure, the motor car authorities maintained that there was an error in the estimation of the number of vehicles, and that account should be taken of the 10,000 trucks which were passed through these services from the factories to the various services at the front.

In the debates it was declared that a tractor went every day from Park No. 10 to Nancy in order to bring back a few pieces of ironmongery, while at the same time another truck made the same journey daily in order to bring back a few entables for the officers' mess. At Chalons fifteen tractors came in every evening with motor car officers to receive orders which could have been given equally as well by tele-

phone. An officer in the motor service who denounced the waste was brought before a court martial and sentenced to fifteen days' imprisonment at hard labor. As the reward of seventeen years' army service and eleven campaigns he had been proposed for the Legion of Honor, but this decoration was withdrawn.

A number of cars were requisitioned at the Rochet-Schneider factory, kept in the open air for several months, and then returned to the factory. The factory refused to accept damaged cars in the place of the new ones they had delivered, and when questions were asked at the Chamber of Deputies it was stated that these cars had been requisitioned as a punishment to the Rochet-Schneider Co. for having built private cars with military labor. Parliament, however, refused to admit requisitions as a mode of punishment, and the officer responsible for this act was removed.

The greatest abuse arises from the fact that every army officer of any standing considers it necessary for him to have the use of a motor car, and wherever possible, to have one particular car and driver always at his disposal. Officers get into the habit of acting as if the cars were their own private property; competition is developed, each officer wanting the best machine and the finest collection of accessories. In some cases a unit has eighty or ninety cars in use, but when a car is wanted for general service the sub-officer is unable to supply one, for every machine is the property of some officer.

Maintained Own Cars

Before the war every person holding ministerial office under the government maintained his car out of his own funds. When the government removed to Bordeaux in September, 1914, cars could not be hired in that town, and the army was obliged to place a car and a military chauffeur at the disposal of each minister. On returning to Paris this practice continued. As an instance, one famous race driver was for months doing taxi-service in Paris at the wheel of a military car used by a civilian member of the government. This is only one of hundreds of such incidents.

The abuse in the use of touring cars is not confined to the French army. It is a natural growth which has to be guarded against in all military formations, for every person in authority considers that it is impossible for him to carry out his functions unless he has the use of a car,

and when he has obtained the use of a car he endeavors to hold it exclusively for his own services.

The only remedy is to refuse to allow any officer, no matter what his rank, to have a personal car. Motor cars must be attached to a particular unit and employed for the general benefit of that unit. In addition, every driver must have a pass book in which all trips are recorded, the persons carried, and the reason for the trip. These pass books exist, but under the old system they were never filled, and when government inspectors were sent out every obstacle was put in the way of their getting information.

More Stringent Measures Applied

Since the scandals have been revealed and discussed in Parliament much more stringent measures have been applied both in the army zone and in the interior. In the Paris camp, for instance, military police are now on duty at every city gate with orders to stop all army cars and ask for justification of the journey they are on. It has not been attempted to lay down hard and fast rules regarding the use of cars, for it is estimated that in some cases a car journey is justified even between towns having a good railroad connection, but it has been decided to take it out of the power of any individual officer to decide that he shall use a car because he considers the car is his own property or because he prefers traveling by road rather than by rail. The experience of France in this connection will be valuable in America, for it is certain that with the formation of an army there will grow up an exaggerated demand for touring cars on the part of officers who could do their work just as well either by train, trolley car or afoot.

Another abuse which has been brought to light is in connection with spare parts. Owing to 1600 mechanics having been withdrawn from the front to be placed in the factories, 2500 cars have had to be returned to the rear for repairs which were normally carried out in the repair parks at the front. In this connection it was declared that the factories did not like to undertake repair work nor to make spare parts. In consequence, instead of getting spares from the respective factories, the army now has to make them itself. It was declared that at one aviation school the pupils were dismounting practically new engines in order to get spare parts which the factories refused to supply.

Answers Call for Army Vehicles

Motor Industry Bids for Contracts to Supply Military Cars and Trucks to Government

CHICAGO, June 11 — Motor car and truck manufacturers responded nobly to the call of Uncle Sam for military vehicles as evidenced by the bids which were opened Friday, yesterday and to-day by Colonel Niskern of the Central Department, Quartermaster's Corps. Bids for the entire vehicle equipment of the United States Army for which the government called on all manufacturers three weeks ago were submitted to the Chicago depot of the Quartermaster's Department in response to the War Department's advertisement of May 10, 12 and 17.

Passenger car makers to the number of fifty-nine offered bids on two- and five-passenger cars. Bids ranged all the way from \$420 for the little Saxon up to \$4,500 for the \$5,000 Locomobile. Most of the manufacturers cut their prices approximately 25 per cent to the Government.

Interest in Trucks

It was in the opening of the offerings of the 1½-ton and 3-ton trucks that the most interest was shown, because these bids were called for originally on the army's standard specifications, which were drawn up with the assistance of the standards committee of the Society of Automotive Engineers. The standard specifications depart to such an extent from the specifications of the manufacturers, as the trucks are built for commercial use, that few, if any, manufacturers could promise early delivery on the type A and type B units as the 1½-ton and 3-ton government specifications trucks are classified. Consequently, word was sent out from the Quartermaster's Department that bids would be received on immediate or early delivery on trucks in quantities according to the manufacturers' own specifications.

There were eighty-three bids on trucks of these two capacities, submitted by eighty-one different manufacturers, most of them bidding on their own specifications

but many of them setting a figure at which they could manufacture according to government specifications within from two to four months.

On the light delivery truck of ½-, ¾- and 1-ton capacity, the bidding was not so heavy. Thirty-three manufacturers offered to build the lighter vehicles, and in addition, four makers of truck-forming attachments offered to submit either the attachments alone or Fords or Dodges formed into trucks in varying quantities and immediate delivery up to three months.

Plans of the War Department, so far as the awarding of contracts is concerned, are not announced as yet. In fact, at the central depot here, the instructions regarding the bids, according to Lieutenant Ecker, are to make a digest of the bids and forward them to Washington for disposal at headquarters. Whether the contracts will be awarded from Washington or Chicago is not known. There were a number of bids received after the set time of opening. They were not opened.

Manufacturers as a whole cut their prices quite considerably in the government bid, both on account of patriotic reasons and because quantity orders were anticipated. Anticipation of increasing prices affected many of the offers. Packard, for instance, set the date of Aug. 10 as the time after which it would have to accept contracts at a considerable increase. Other concerns made a price on deliveries up to Jan. 1, approximately 10 per cent lower than deliveries after that date. Other manufacturers put in a clause stating that their price was based on current material and part costs and would have to be increased in proportion as the costs increased. This averaged 10 per cent.

Many of the manufacturers took it into consideration by offering to build a truck to government specifications at a flat rate

of cost plus a per cent. Willys-Overland offered to manufacture at cost plus 15 per cent and most of the others made their figures cost plus 10 per cent. Some of the concerns offered to turn over their plant, wholly or in major proportion, to the government for truck manufacture. J. C. Wilson Co., for instance, offered to turn over 75 per cent of its capacity for government production at a cost-plus-10-per cent basis and stated it could turn out 6400 per year. Denby Motor Truck Co. placed its entire production of 200 per month at the disposal of the government on four months' notice.

The Four-Wheel Drive Co., Clintonville, offered to license other manufacturers to use its four-drive patent on government work.

Unusual Requests

Some unusual requests were brought to light in the matter of suggestions for government control of supplies, as for instance, that of Charles E. Reiss & Co., who made a proviso in their contract that the government guarantee delivery of parts. Some of the big offers included those of Velie, which bid on any number up to 5000; General Motors, 1000; Nash, 5000 and 500 per month after the first year; Stogeman, 2000; J. C. Wilson, 4800; Willys-Overland, 10,000 at the rate of 500 per month on the big trucks, and fifteen per day on the small ones. Studebaker is prepared to furnish 1200.

The lighter trucks were offered both with bodies and without, but there was a special call for government specification bodies for type A and type B trucks, and there were nearly 100 body manufacturers who made bids on service bodies with or without their canvas covers, which ran from \$200 to \$350 in price and were offered in large lots such as that of the J. D. Brill Co., which said it was able to furnish 21,000 in the first year.

BIDS FOR PASSENGER CARS FOR U. S. ARMY

Opened June 8, 1917

FOURS									
MAKER	RATE OF DELIVERY	MODEL	LIST PRICE	NET PRICE	MAKER	RATE OF DELIVERY	MODEL	LIST PRICE	NET PRICE
Harroun	25 per day	Military roadster		\$ 752.00	Overland	100 per day	B5-B-4	895	760.65
Harroun	25 per day	Touring		667.25	Overland	10 per day	B5-B-4 roadster	895	748.00
		After Nov. 1—			Willys-Knight	10 per day	S8-4	1,396	1,185.75
		Military road..		852.00	Willys-Knight	25 per day	S9-4	1,396	1,178.00
		Touring		767.35	Scripps-Booth	100 per week		925	794.95
Monitor	15 per week	5-passenger	895	855.00	Dodge	100 per day	6-pass. touring	835	735.00
Reo	15 per day	Roadster	875	825.00	Dodge	100 per day	2-pass. roadster	835	735.00
Reo		8	875	825.00	Buick		E-35		795.00
Empire	8 per day	50	1,125	810.00	Crow-Elkhart	150 per month	CE-35	815	760.50
Empire		51	1,125	873.75	Studebaker	625 per month	4 touring	985	738.75
Inter State	1 per day	5-passenger	925	753.00	Studebaker	325 per month	4 roadster	985	738.75
Inter State	1 per day	Roadster	925	715.00	Moline	100 per month	4	1,495	1,270.00
Monroe	250 per month	M-4	1,095	850.00	Briscoe		4	845	725.60
Monroe		M-3	665	450.00	F. F. Stearns	50 per month	4	1,495	1,260.00
					Saxon	40 per day	2-passenger	495	420.25

MAKER	RATE OF DELIVERY	SIXES MODEL	LIST PRICE	NET PRICE
Monitor	15 per week	5-passenger	1,095	1,095.00
Marmon	100 in 40 days	6	3,050	2,480.00
Westcott	100 per month	6-touring	1,790	1,432.00
Reo		6-M	1,250	1,200.00
Moon	20 per week	6-N	1,250	1,200.00
Velle	5 per day	6	1,750	1,500.00
Jordan	25 per week	6-27	1,650	1,327.50
		6 (350)	1,795	1,400.00
Empire	8 per day	After Sept. 1.		1,475.00
Kissel	20 per day	70-A	1,285	935.00
Kissel	20 per day	6-touring	1,295	1,050.00
Franklin	20 per week	6-roadster	1,295	1,050.00
General Motors	250 per month	6	1,950	1,560.00
National	50 per month	Oakland 6	875	850.00
Bartholomew	50 per month	A-6	1,850	1,618.75
Lexington	25 per day	Glide 6-40	1,295	1,000.00
Grant	25 per month	K-6	1,285	1,285.00
		After Aug. 1—	805	657.00
Marion-Handley	100 per month	G-6	805	755.00
Marion-Handley		5-passenger	1,350	1,140.00
Mitchell	50 per day	7-passenger	1,650	1,650.00
Chandler	25 per month	D-540	1,195	875.00
Haynes	100 per month	6	1,595	1,295.00
Haynes	100 per month	6 5-passenger	1,595	1,355.75
Anderson	100 per month	6	1,725	1,466.25
Chalmers	10 per day	6	1,295	906.50
Chalmers	10 per day	5-touring	1,250	
Chalmers	10 per day	Roadster	1,250	
Chalmers	10 per day	7-pass. touring		1,095.00
Columbia Motor	80 per day	6	1,250	1,180.00
Buick		E-49	1,385	1,495.00
Mitchell	50 per day	6 B-40	1,195	875.00
Mitchell	50 per day	6 C-42	1,425	1,094.00
Patterson	3 per day	6	1,165	
Elgin	125 per month	5-passenger		837.25
Studebaker	1,000 per month	Touring	1,250	937.50
Studebaker	300 per month	Roadster	1,250	937.50
Davis		6 H	1,295	961.25
Davis		6 I	1,295	961.25
Davis		6 J	1,595	1,195.25
Apperson	5 per day	6	1,350	1,432.00
McFarlan	4 per month	6	3,800	2,450.00
Singer	12 per month	5-passenger	5,900	2,575.00
Locomobile	100 per month	6	5,000	4,500.00

MAKER	RATE OF DELIVERY	EIGHTS AND TWELVES MODEL	LIST PRICE	NET PRICE
Lewis T1 & Mch.	5 per day	8		948.00
Knight	5 per day	8-8	1,950	1,667.50
King	10 per day	8 7-passenger		1,250.00
King	10 per day	8 3-passenger		1,250.00

MAKER	RATE OF DELIVERY	MODEL	LIST PRICE	NET PRICE
King		After Oct. 15— cost plus fixed charges plus 10 per cent.		
Cadillac	20 per day	8	2,340	2,097.50
Cole	200 per month	8	1,795	1,535.00
F. F. Stearns		After Jan. 1.		1,695.00
National		AK-12	2,250	1,800.00
Packard	100 per month	12	2,250	1,968.75
			1,640	2,592.00
MISCELLANEOUS				
Nash Motors	50 per day		1,465	1,173.00
Cortland	50-75 by Nov.			775.00
Nabob	25 per week			795.00
Overland	50 per day	90-roadster	695	578.00
Anderson	25 per week			1,000.00
Paige	10 per day	Fairfield		1,000.00
Paige	10 per day	Stratford		1,104.50
Paige	10 per day	Linwood		863.50
Paige	10 per day	Dartmoor		863.50
		After Dec. 1— cost plus 10 per cent. or 25 per cent discount from list.		
Seneca	4 per day			691.00
Nelson	1 per day	5-pass. touring		1,100.00
Nelson		2-pass. roadster		960.00
Hoosier	75 per month			905.00
Hudson		7-pass. touring		
		1-100	1,650	1,378.75
		101-100		1,354.00
Jackson	10 per day		1,395	1,000.00
Kline	25 per month	After Sept. 1.		1,100.00
Abbott	100 per month	5-passenger		1,295.00
		6-80 touring		1,145.00
Liberty	300 per month	Roadster		752.00
		5-pass. touring		1,000.00
Cruiser	75 per month	Roadster		1,000.00
		Touring		908.00
Partin-Palmer	2 per day	Roadster		908.00
Apperson	5-10 per day	5-pass. touring		751.11
Hatfield	15 per day	6 7-passenger		1,990.00
		H-roadster		775.00
		Other car		575.00
		25 per cent discount.		
		25 per cent discount.		
		20 per cent discount.		

BIDS ON 1 TO 200 U. S. ARMY TRUCKS

1/2-ton, 3/4-ton and 1-ton—Opened June 11, 1917

Maker	DELIVERY	PRICES	1/2-ton	3/4-ton	1-ton
Metropolitan Motors, Inc.	30 days	40		\$ 895.00	
Bethlehem Motors	10 days				\$1,005.00
Norwalk	30 days	75		1,135.00	
Economy	30 days	25	\$ 708.75		
Commercial Vehicle Motors Co.	2 days	75	745.00		1,190.00
Seneca			643.00		
Commerce Motor Car Co.			Bidding on 1000, no price		
Forscher Motor Truck Co.	7-19	4	1,625.00		1,825.00
Maxwell					795.00
Superior Motor Truck Co.	10 days	20			1,250.00
Vim	6-20		875.00		
			Price according to body and model		
Koehler	Immed.	20			1,075.00
Beck M. T. Co.	60 days	12			1,080.00
Packard					1,860.00
Henney	10 days	8			1,440.00
			After 8/10, \$2,232		
Studebaker			663.75		900.00
Garford	3 weeks	100		1,657.50	1,855.00
Selden Truck Sales		25			1,810.80
Willis-Overland	24 hours	375	722.50		
Lippard-Stewart	2 weeks		1,140.00	1,740.00	2,250.00
			Worm drive, price with body		
Abbott & Downing		5			1,700.00
Nash Motors Co.	30 days	200			1,232.50
Rush Co.	30 days	50	750.00		
			Body extra		

Maker	DELIVERY	PRICES	1/2-ton	3/4-ton	1-ton
Martin Truck & Body Co.	Immed.	10 up		900.00	
Brinton M. T. Co.		25		Body extra, total 400	1,125.00
I. H. C.	10 days	80		Chassis only	
Commerce M. C. Co.	7-1	60		1,160.00	
Republic				Body extra	1,240.00
Federal		80			1,850.00
				Or, cost plus 10%	1,485.00
Reo	30 days	900		946.00	
				Complete	
Dineen	Immed.		Model 10 chassis, \$1,289; body, \$225		
			Model 12 chassis, 860; body, 150		
Rainier			875.00	1,020.00	1,875.00
			Chassis only, body extra		
Collier M. T. Co.	4 months	50		900.00	
			After Jan. 1, \$1,000		
Illinois Auto Truck Co.					
Immediate delivery, 15 per month..			Ford with attachment..	\$ 660.00	
			Dodge with attachment.	1,050.00	
Smith Motor Truck Co.					
24 hours, 100 to 200 per day.....			Ford, 1/2-ton.....	627.46	
			Ford, 3/4-ton.....	627.46	
Car with attachment.....			Dodge, 1/2-ton.....	1,102.50	
			Dodge, 1-ton.....	1,102.50	
Hudford—					
Attachment for Ford....	397.50				
Attachment with body....	835.00				
Maxter—					
Ford with attachment....	784.30				
Dodge with attachment..	1,246.00				
			Delivery 30 days,		
			Delivery 30 days, 200 per month...		

BIDS ON TYPE A AND TYPE B ARMY CHASSIS

1 to 3,500 Each, 1 1/2-Ton and 3-Ton, Opened June 10

Maker	DELIVERY	PRICES	1 1/2-ton A Body	3-ton B Body
Dayton M. T. Co.	3 days	12	350	\$4,000 Extra
Bowling Green		2000	\$2,785	
Moreland		550	2,250*	2,880*
Corbitt M. T. Co.		10	2,500*	\$200
Selden	30 days	100	2,807	3,710
Master T. Co.	5 days	100	2,300*	
Burford, Ltd.	Immed.	100	2,483*	3,813*
Onelda M. T. Co.	July 10	5	1,455	2,520
White	July 1	200	3,150*	3,800*
Signal	August		2,300*	3,000
Bourne Magnetic	August	25	2,750*	
Schacht	Aug. 15	25	2,650*	3,200
Tower M. T. Co.		25	1,640	
Tractor Prod. Co.				3,240
(F-W-D)				

Maker	DELIVERY	PRICES	1 1/2-ton A Body	3-ton B Body
Dart	30 days	100	2,975*	
Kelly Springfield	Jan. 1	280	2,600*	3,442*
Kelly Springfield	Jan. 1	280	3,000*	3,580*
Norwalk M. Co.				2,550
King M. Co.				
Grove M. T. Co.	Oct. 1		1,786*	
Pierce-Arrow	Sept.	100-300	3,500*	4,300*
Pierce-Arrow	Jan. 1	250	3,800*	
B. & M. Truck Co.		100	3,100*	
Staver Carriage Co.				3,950*
Winther	Aug. 5		2,325*	
		2500	2,850*	
Gramm-Bernstein	July	66	2,790*	3,100*
Federal M. T. Co.			1,066*	305 2,583*
Velle	30 days	100	2,700*	205 3,750*

Maker	DELIVERY			PRICES		
	Begin	Monthly	Total	1½-ton A Body	3-ton B Body	
Pagel			100	3,500†	4,500†	
Republic M. T. Co. Aug. 10			3300	2,020†	2,575†	
Garford	July	100	1050	2,730	3,537	288
Brockway M.T. Co.			1492	2,975†	3,872†	295
H. E. Wilcox. Sept. 29		75		2,200*		
Wichita Falls						
M. T. Co.		5	100	2,950†	3,800†	
Kissel M. T. Co. 4 months	150			2,627†		
Kissel M. T. Co.		75		2,100*		
Atchison M. T. Co.		50	750	2,400*	2,000*	
Moon M. C. Co.		50	500	2,550†	285	
Gen'l M. T. Co. Immed.			1000	2,390*	3,140*	
Dorris M. C. Co. Oct. 10		10	750	2,448*		
Sandow	Sept. 1	20	300		2,983	
Reo	30 days	75		1,485*	144	
Pullmore M. T. Co.		25	300		3,000	
Consolidated	July		585	2,155*	375	
Consolidated			600	2,250†		
Bessemer M. T. Co.		225		2,325*	3,313†	
Bessemer M. T. Co.				2,413†		
Lippard-Stewart		70		3,237	250	
Lippard-Stewart				3,300†		
Stewart M. T. Co. July		100	600	1,785*		
Forscher	July	5		2,055		
Hewitt-Ludlow		4		2,850*	3,950*	
Standard M. T. Co.		125		Cost plus 10%		
Chas. P. Reiss Co.		100		(Govt. to guar. parts)	3,500†	
(F-W-D)						
Nash Motors Co. 45 days	250		5000	2,465		
F-W-D	July 1	120	910	(Govt. spec. with exptsn.		
Stegeman		100	2000	(Govt. spec., 4m.) 3,200*		
Whit-Will			12	2,515†	2,945†	
Diamond-T	Immed.	250	975	2,300*		
Day-Elder				2,125	2,963	
O. Armleder	60 days	75		1,200*	1,687*	
Denby M. T. Co. Aug. 1		200	1050	2,150*	2,900*	
J. C. Wilcox. 90 days		400	4800	2,425*		
Sullivan M. Corp.		150		2,915*		
Maccar	40 days	10		2,200*	3,058*	
Hannay Motors		2	3700	2,350*	3,400*	

Maker	DELIVERY			PRICES		
	Begin	Monthly	Total	1½-ton A Body	3-ton B Body	
United Motors Co. 30 days		25		2,800*	2,870*	
United F. W. D. T. Corp. Sept.		20 up		3,250 or cost plus 10%		
U. S.		500				
Indiana T. Co.		50		2,562	3,286	
Willys-Overland		500	10000	Cost plus 15%		
Bethlehem Motors. 45 days		100 up	5000	2,175	190	
Hurlburt				2,350*	8,900*	
				2,550†	4,250†	
Rowe			500	2,595		
Locomobile	Immed.	100 up			3,871†	
					4,379†	
International M. C.					4,175†	
Service M. T. Co. 60 days		100		2,900†	235	
				2,500*	3,000*	
Clyde Car Co. 30 days		1000	2600	2,465*	3,290	
Reck M. T. Co. 60 days		12		1,950*		
Dineen M. T. Co. 90 days		25 up		2,996*		
Packard M. C. Co.		500	3000	3,474†	4,125†	
Packard M. C. Co.				3,082	3,536	
Packard M. C. Co.				2,803	3,864	
Note—Govt. spec. with certain exceptions.						
Atterbury		40	500		3,500†	
Acme		50	600		3,000†	
Noble (Kendallville, Ind.)			50	2,100*		
Transport Tr. Co.		8½	100		4,380†	
J. Cunningham's						
Sons Co. Jan. 1		50	200		3,000	
Strand		250				
Peterson Co.		10	100			
Note—Bidding on makers' specifications.						
†Bidding on government type A military truck.						
‡Bidding on government type B military truck.						
§Bidding on makers' specification, extra charge for steel wheels.						
¶With body.						

Value of Mechanical Traction in War

WASHINGTON, D. C., June 11.—The use of mechanical traction, considered one of the most important adjuncts to the present war, whether tractors are used for transportation of troops, supplies, guns, munitions of war or for the tilling of the soil, is now being given the closest study by the Tractor Standards Division of the Society of Automotive Engineers. The extent to which mechanical traction is to be used in these various capacities, and the value of such use to the nation in time of war, according to Coker F. Clarkson, General Manager, Society of Automotive Engineers, can hardly be estimated at this time.

Mr. Clarkson, discussing this question, called attention to the development in this country of the first completely motorized field artillery battery, successful experiments with this battery having been made in work at Fort Sill, Okla. Speaking further along these lines, Mr. Clarkson said:

"The great probability of the farm tractor in the solution of the world's food problem is, of course, widely appreciated, but many points, however, are involved at this time in the adequate production and use of farm tractors. In the nature of a starting point, it is the fact that the average farmer does not understand sufficiently the merit of the tractor as a tool for him and is not trained as he should be in operation of the mechanical apparatus. Any machinery ever produced requires some attention at regular intervals.

"There are well known cases of tractors which have failed in the hands of some owners, and have been highly successful in the service of owners who have some adequate knowledge of the attention actually required by the machines. The agriculture press is rendering a national service of the highest value in making plain the requirements that can be met easily by reasonable effort in the forward march of intelligent modern farming.

"There is no manner of doubt that a great deal of tractor development, as an immediate result of military activities, is at hand and in sight. The most spectacular feature of this development is the military work, but

the production of crops in greatly increased quantities is a consideration second to none in the national welfare. The work of the Society of Automotive Engineers applies at many points of contact, and the result that will be achieved by it through well organized proceedings now in effect will be as important and striking as any with which this remarkable organization is to be credited.

"There are many logical reasons in favor of the substitution of motor-driven apparatus for horses in the marshalling of field guns. Horses of the type required are becoming more and more scarce and costly. It has been established that certain types of ground, difficult to negotiate, can be covered by the use of tractors when this would be impossible with horses.

"The tractor, as a whole, is in one sense more vulnerable to gun fire than a field artillery team of eight horses; on the other hand, the tractor can work longer and be repaired within shorter time than is required generally for a horse to recover from any ailment. Sentimental reasons, of course, are in favor of the horse being emancipated from the frequently heavy work of gun haulage. It seems very likely that greater development of tractors of the military type will redound to the benefit of the commercial users tractors.

"The use of tractors in the European war was based very largely upon commercial development of American engineering products, and since the war American engineers have forged ahead and will undoubtedly bring about increasingly gratifying results at an early date."

TRACTORS AFTER WAR MATERIALS

Washington, D. C., June 11.—The situation with respect to an increased use of farm tractors as a decidedly important step towards the successful prosecution of the war in the way of supplying foodstuffs for the army and to aid the United States in helping to feed its Allied countries has improved recently to a slight extent, according to Dr. B. F. Galloway, assistant to the Secretary of Agriculture, but the desired improvement is not expected by Dr. Galloway until the more immediately pressing matters of war organization, taking in the question of munitions, etc., have been more fully taken care of.

This means that the raw material nec-

essary in turning out tractors for farm use cannot be obtained until the other demands have been met, at least in great part.

Arnold P. Yerkes, of the farm management department of the Department of Agriculture, who has on file in his office detailed information touching the number of farm tractors now actually owned by operators of farms and who is in close touch with the extent to which these tractors are being utilized, expressed the view that the only thing to do at present, aside from increasing the hours per week tractors are operated, is for all influences actively interested in this proposition to work to the end that the manufacturers of tractors may be able to get sufficient quantities of raw material to enable them to supply in part at least the demand for the tractors.

Mr. Yerkes said the introduction of tractors into farm work is not by any means, as many seem to think, confined to the middle western and other western states. He said tractors are now in use to a gratifying extent in the more eastern states; that states, for instance, like Pennsylvania and others are using them in large numbers.

With the assistance of H. L. Horning, now connected with the farm and ordinance tractor division of the government in an important advisory committee, due to his extensive knowledge of the situation, it is hoped that marked improvement in the time of operation of farm tractors, together with a possible increased output at the factories, will result. In fact, this already has resulted to an extent, with hopes for the immediate future.

Cars of Future to Use New Fuel?

Gas Engine Makers Discuss Kerosene—Paper on Holley Vaporizer Sees Straight Cut as Coming Power for Passenger Vehicles

CHICAGO, June 7—The possibility of using for all power purposes where gasoline is now employed, a fuel in which kerosene and other lower grade distillates are incorporated, was the chief feature of interest in discussions arising from the tenth annual convention of National Gas Engine Association at the Hotel Sherman, yesterday and to-day. Don T. Hastings, chief engineer Holley Bros. Co., made the suggestion that the most logical method of utilizing available fuel supplies for motor cars and other internal combustion engines was by the use of a "straight cut fuel." By this is meant permitting the distillation from the crude to run until the distillate reaches a boiling point of 600 deg. F. thus including present-day gasoline, naphtha, kerosene and so on in the same run instead of cutting at lower boiling points for gasoline and marketing the higher boiling point products separately as kerosene, etc.

On Market Here Soon

This proposition was favorably discussed by many of the gas engineers present, particularly by President Bement. It is impossible, however, to get an expression of opinion from the oil men on the subject. Hastings' suggestion came about in the discussion of his paper on the Holley vaporizing system for the use of heavy liquid fuels in which he described the Holley vaporizers which are now in service on Ford cars and Ford tractors in England, and which will be on the market shortly in America on Ford products and also in other sizes for cars of other makes. This vaporizer has been described in earlier issues of *MOTOR AGE* and is again illustrated and described in a reproduction of Hastings' paper on these pages.

Hastings also described the construction and operation of the Holley air washer, which has been developed for tractor use to remove dust from the air.

The paper concluded with a statement that while the Holley vaporizer has been developed with the idea of using kerosene as fuel, it is not the belief that kerosene will ever be used to any extent by passenger cars. For their use a fuel will be developed which will contain more and more of the higher boiling point fractions which now constitute kerosene; in other words, that the fuel of the near future for passenger cars will approach the straight cut fuel; that is, all of those fractions of petroleum below an end point of 600 deg. F., will be combined into the future motor fuel. A curve on these pages shows the comparative distillation of the straight cut fuel, with English gasoline, kerosene, distillate, and American gasoline.

In the discussion of the Hastings paper, former estimates of the power of kerosene were confirmed by the statement that kerosene as a fuel, produced approximately 80 per cent as much power per gallon as gasoline. This chiefly is due to the lower volumetric efficiency occasioned by the necessity of heating the kerosene to such a high point for vaporization.

George Briggs of Wheeler & Schebler, Indianapolis, Ind., mentioned an instance in which government tests had shown as high efficiency per pound of kerosene as gasoline in an engine in which the temperature of the fuel was lowered, just before ignition, by the introduction of a shell of cold air just inside the cylinder wall.

Mr. Hastings said that the Holley vaporizing system as marketed for Fords in service would comprise a new cylinder head, giving lower compression and better circulation of water than is obtained with the Ford for gasoline and that this is now being supplied by the Ford company for export service. He stated that the Holley company now had the contract with the British government for from 5000 to 6000 kerosene vaporizers and that these would be on the market in America within from one to three months.

Use of kerosene for internal combustion engines was the chief subject of discussion among the gas engine makers. There were two other papers on this subject, both of the latter, however, applying only to stationary units. One of these was "A Kerosene Carbureter," by Theo. C. Menges, Associate Mfg. Co., and the other "The Carburetion of Kerosene," by W. G. Clark, the Wilcox Bennet Carbureter Co.

Other papers of interest to the stationary engineers in particular, were given at the meeting.

The Holley Vaporizer

By Don T. Hastings

MEET us half way to avoid a tremendous shortage of gasoline for motor vehicles in 1919, or after the war, by devising carbureters to handle a wider range of fuels."

This appeal to the automotive industries by the American Chemical Society, at its recent annual meeting, fairly represents the attitude of those connected with the production of motor car fuels.

The annual production of petroleum is by no means keeping pace with the consumption. The figures for 1916 show an actual slight decrease over those for 1915, and in addition to this, the exportation of gasoline and other petroleum products showed a substantial increase; the net result being that the supply of petroleum available for this country was 7,000,000 barrels less than the preceding year. At the same time the number of users of the lighter petroleum products has increased with extraordinary rapidity.

The available supply of so-called gasoline has been substantially increased by the various cracking processes, the manufacture of casing-head gasoline, and the production of gasolines which include in some cases part of the kerosene fraction of petroleum. In spite of these increases, however, it is clearly evident that the demand will far exceed the supply, unless the automotive industries take prompt action along the lines indicated in the American Chemical Society appeal.

The Answer

The Holley vaporizing system presents an answer to this fuel problem, by allowing the satisfactory use in internal combustion engines of kerosene, distillate, benzol, gasoline or any liquid hydro-carbon fuel whose final boiling point is not over 600 deg. F.

This Holley vaporizing system has been in process of development for some three years and has been tested in service sufficiently to prove it satisfactory commercially. The system consists, for tractors and trucks in government service, of the heavy fuel vaporizer proper, and an air washer. The necessity of some efficient means of removing dust from the air entering the engine cylinders has been deeply impressed on all those who have been working with tractors in the field, or with trucks in the government service on the Mexican border. For trucks in ordinary service, motor boats and passenger cars, the Holley vaporizer alone is necessary.

The Holley Vaporizer

The Holley vaporizer utilizes heavy fuels by heating a mixture of the fuel with a small quantity of air to the point where it is in a suitable state for the addition of the large quantity of air necessary to form the desired explosive mixture. This mixture, of fuel and primary air, is far too rich to support combustion, so that it may travel through a highly-heated passage without danger of igniting. The rich mixture is at a temperature of 300 to 350 deg. F. before it is diluted by the main air supply. The temperature of the resulting mixture, delivered to the engine cylinders, ranges from 160 to 275 deg. F., depending on operating conditions.

See this diagram completed by the use of gas

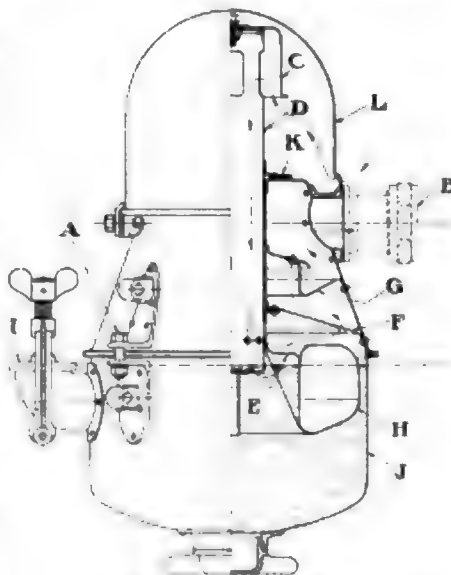


Diagram of Holley air washer

line when the engine is cold, but when the engine is still reasonably warm from previous operation, it can be re-started on kerosene without trouble.

To avoid pounding with the ordinary engine, it is found necessary to reduce the compression when using kerosene, 15 to 20 lbs. below that used with present-day gasoline. There is no doubt that this reduction in compression can be avoided by refinement in design of the walls of compression spaces in engines, including the tops of the pistons. This has been demonstrated conclusively by the work reported during the past year by Mr. Horning of the Waukesha Motor Co. The injection of water, in the proper amount, is also of material assistance in eliminating this objectionable pounding.

The Holley Air Washer

The Holley air washer was developed in response to the demand for an efficient means of removing dust suspended in the air in the fields or on the road. It consists essentially of a tank containing a quantity of water through which the air entering the engine cylinders is forced to pass. In detail the washer consists of a tank, J, carrying the water, above which is supported by a suitable float, H, the tube, D, through which the air enters the washer. The lower end of this tube dips beneath the surface of the water about $\frac{1}{4}$ in., this depth of immersion being maintained by the float as the water is exhausted from the air washer. Above the float is arranged a series of baffles, F, G, which prevents any large drops of water from passing out of the washer with the air. The top of the float tube is provided with a cap, C, which prevents any chunks of dirt entering the tube, and also acts as an air shut-off when the water is almost exhausted, thus automatically stopping the engine and warning the driver that the air washer is in need of refilling. If this is impossible immediately, the engine may be again operated by utilizing the water filler, I, as an emergency air entrance. The upper end of the float tube is further protected by the housing, L, all the air being forced to pass between the edge of this housing and the upper tank at low velocity.

This type of air-cleaning device was adopted as the one presenting the most desirable features, after a very careful review of the possibilities of construction.

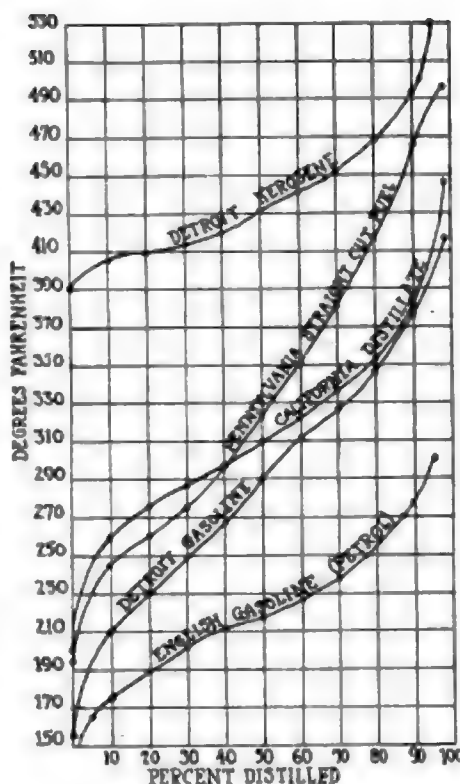
Air purifying apparatus as used in other lines of business has been of two main types—wet and dry. The dry type has been used mainly in such devices as exhaust heads for collecting shavings, saw-dust and similar materials. The wet type is used in conditioning air for public meeting places, and the factories of those concerns, the preparation of whose produce is dependent on maintaining certain fixed conditions of the air as regards absence of dirt, temperature, humidity, etc. Among the many lines of business employing apparatus of this type may be mentioned photographic supply manufacture and tobacco manufacture.

The dry type of air-purifying apparatus for use on trucks and tractors must depend either on centrifugal force, or large areas of fine mesh screen. The results of tests along these lines were discouraging, either because of incomplete cleansing action, or large space required if the supply of air to the carburetor was not to be greatly restricted.

The wet type of air washer was chosen because of the following advantages:

- 1—Practically complete removal of dust or dirt entering with the air.
- 2—Very slight power required for operation, if any.
- 3—Relatively small size.
- 4—Slight increase of power delivered by the motor if using an exhaust heated carbureting device.

The only serious objection to this type of



Comparative distillation curves of straight cut and other fuels

apparatus is the consumption of water in those regions where humidity is low and temperature high. Tests so far have shown water consumption between 1/20 and 1/10 of a pound per horsepower per hour; this was with humidity ranging from 25 per cent to 75 per cent and with air temperature approximately 80 deg. At a temperature of 110 deg., this water consumption would be approximately doubled.

It is impossible to reduce this water consumption by any mechanical means, as tests have shown that no water leaves the washer in the form of drops, but that all the water used is taken up as water of saturation of the air. In no case has the air leaving the air washer been completely saturated.

This type air washer is particularly suitable for use with the Holley vaporizer, or other exhaust heated carburetor, but may be used satisfactorily with ordinary carburetors with practically no change in adjustment. A

recent test by a prominent truck maker showed the same horsepower and fuel consumption with and without the air washer, using the regular gasoline carburetor. It is probably advisable, however, to apply heat between the air washer and the carburetor by utilizing the exhaust, when the air washer is used with an ordinary type of carburetor. The air entering the air washer, however, should be maintained at as low a temperature as possible, to conserve the water.

Holley Vaporizers in Service

That the Holley vaporizer is a practical solution of the utilization of heavy fuels, is shown by the continued reports of satisfactory operation of those now in use in England and France, on Ford tractors and cars. The tractors were shipped abroad several months ago and have been in almost continuous service ever since.

The British Government has made arrangements to manufacture the Ford tractor in Great Britain as a war measure in order to increase the home production of food supplies. All these tractors are to be equipped with the Holley vaporizer, arrangements to manufacture which are now being completed by the English branch of Holley Bros. Co.

In this country and England, the Holley vaporizer is now being marketed for application to Ford cars. This instrument is constructed with two float chambers, for gasoline and heavy fuel respectively. A 3-gal. tank for gasoline is furnished with each outfit, the regular Ford tank being utilized for the heavy fuel.

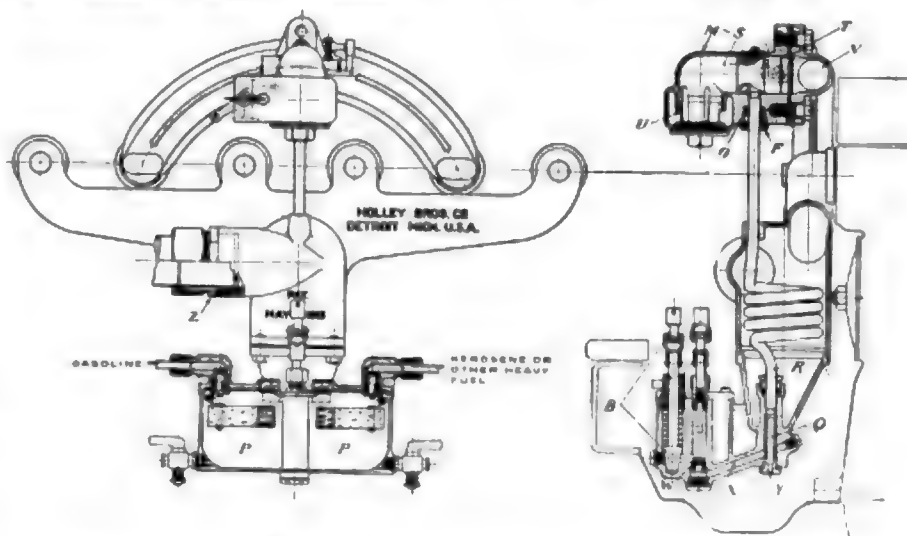
Starting is accomplished on gasoline, as with an ordinary carburetor, and then 1 to 3 min. after starting it is possible to shift from gasoline to the heavy fuel, even during cold winter weather.

Acceleration and maximum speed are practically the same as obtained on gasoline, and no trouble is experienced from smoke, except in cases of failure of the ignition in any one cylinder. If this happens, kerosene will gradually collect, with the result that when ignition again takes place there will be considerable smoke until the accumulation is disposed of.

In case of ignition failure, as mentioned previously, some of the kerosene collecting in the cylinder will work past the piston rings and dilute the oil in the crankcase. For this reason it is advisable to watch the quality of the oil carefully; until time is determined during which it is safe to run without renewing the oil.

While the Holley vaporizer has been devel-

(Concluded on page 43)



Sectional views of Holley vaporizer now in service on Ford cars and tractors in England

ville, LaVergne, Murfreesboro, Beechgrove, Noah, Manchester, Hillsboro, Pelham, Wonder Cave, Monteagle, Tracy City, Sequatchie, Jasper, Rankin's ferry across Tennessee river, Wauhatchie, Chattanooga, Rossville, Boynton, Ringgold, Dalton, Resaca, Calhoun, Adairsville, Cassville, Cartersville, Allatoona, Acworth, Kennesaw, Marietta, Smyrna, Atlanta, Mountain View Station, Jonesboro, Lovejoy, Hampton, Pomona, Griffin, Milner, Barnesville, Forsyth, Lorane Station, Macon, Echeconne Station, Perry, Hawkinsville, Big Creek to Abbeville.

This trip approximates 2000 miles. Vols. 7, 5 and 6 of the Automobile Blue Books, published by the Automobile Blue Book Pub. Co., 910 South Michigan avenue, Chicago, contain complete running directions.

Chicago—Zanesville, Ohio

Hamilton, Ohio.—Editor MOTOR AGE—Give me the best routing from Chicago to Zanesville, Ohio, and also from Cincinnati to Zanesville. Where can I secure a guide book?—O. M. Gross.

For the first route proceed from Chicago to South Chicago, Hosserville, Highland, South Gary, Hobart, Wheeler, Valparaiso, Westville, Laporte, South Bend, Ligonier, Merriam, Churubusco, Fort Wayne, New Haven, Van Wert, Delphos, Lima, Kenton, Meeker, Marion, Delaware, Columbus, Granville, Newark, Jacksontown, Linnville to Zanesville.

From Cincinnati go through Norwood, Pleasant Ridge, Montgomery, Twenty-Mile Stand, Posters, Morrow, Clarksville, Sligo, Wilmington, Sabina, Washington Court House, Circleville, Amanda, Lancaster, Sego, White Cottage to Zanesville.

Vol. 4 of the Automobile Blue Books, published by the Automobile Blue Book Pub. Co., 910 South Michigan avenue, Chicago, contains complete running directions for the above trips. Price \$3.

Great Falls, Mont.—Kansas City, Mo.

Belt, Mont.—Editor MOTOR AGE—Give a route from Great Falls to Kansas City, Mo.—Sam J. Wright.

From Great Falls the route lies through Belt, Irmington, Stanford, Windham, Benchlands, Moccasin, Hobson, Lewistown, Forest Grove, Tyler, Roundup, Thirty Mile, Billings, Warren, Cowley, Lovell, Greybull, Basin, Manderson, Worland, Nelber, Chatham, Kirby, Thermopolis, Reids Ranch, Lost Cabin, Arminto, Walman—Inquire here as to best road for Casper—Casper, Glenrock, Douglas, Orin Junction, McKinley, Glendo, Badger, Uva, Wheatland, Chugwater, Cheyenne, Egbert, Bushnell, Kimball, Potter, Sidney, Sunol, Lodgepole, Chappell, Bigspring, Brule, Ogallala, Paxton, Sutherland, North Platte, Gothenburg, Willow Island, Cosad, Lexington, Overton, Elm Creek, Odessa, Kearney, Shelton, Wood River, Grand Island, Chapman, Central City, Clarke, Silver Creek, Duncan, Columbus, Richland, Schuyler, North Bend, Ames, Fremont, Valley City, Waterloo, Elkhorn, Omaha, Council Bluffs, Glenwood, Randolph, Shenandoah, Tarkio, Burlington Junction, Wilcox, Maryville, Savannah, St. Joseph, Halleck, Dearborn, Edgerton, Trimble, Smithville, Gashland to Kansas City.

Vol. 7 of the Automobile Blue Books, published by the Automobile Blue Book Pub. Co., 910 South Michigan avenue, Chicago, contains complete running directions for this trip.

Duluth, Minn.—Binghamton, N. Y.

Duluth, Minn.—Editor MOTOR AGE—Give a route from here to Binghamton, N. Y., passing through Jamestown, N. Y. Also a route from here to Cameron, Mo.—C. O. Applehagen.

From Duluth proceed to Superior, Itasca, Hawthorne, Lake Nebagamon, Barnes, Drummond, Grandview, Bibson, Astland, Marengo, High Bridge, Nelson, Canyon, Morse, Glidden, Butternut, Park Falls, Fitch,

Phillips, Ogema, Westboro, Chelsea, Medford, Wausau, Bowler, Tilleda, Thornton, Shawano, Green Bay, Denmark, Kellner's Corners, Manitowoc, Erdman's Corners, Sheboygan, Port Washington, Lakefield Corners, Milwaukee, Cudahy, South Milwaukee, Racine, Kenosha, Winthrop Harbor, Zion City, Waukegan, North Chicago, Highland Park, Kenilworth, Evanston, Chicago, South Chicago, Hessville, Highland, South Gary, Hobart, Wheeler, Valparaiso, Westville, Laporte, South Bend, Mishawaka, Elkhart, Goshen, Benton, Ligonier, Wawaka, Brimfield, Kendallville, Butler, Edgerton, Bryan, Archbold, Wauseon, Toledo, Lemoine, Woodville, Fremont, Clyde, Bellevue, Monroeville, Norwalk, Townsend, Wakeman, Oberlin, Elyria, Morley's Corners, Cleveland, University Circle, Willoughby, Painesville, Unionville, Geneva, Ashtabula, Conneaut, Girard, Erie, Harbour Creek, Moorheadville, North East, Pa., Ripley, Forsyth, Westfield, Mayville, Hartford, Dewittville, Bemus Point to Jamestown.

Vols. 5, 4 and 1 of the Automobile Blue Books contain complete running directions for this trip.

From Duluth drive to Carlton, Atkinson, Barnum, Moose Lake, Rutledge, Sandstone, Hinkley, Pine City, Rush City, White Bear Station, St. Paul, Rosemont, Farmington, Northfield, Dundas, Faribault, Medford, Owatonna, Geneva, Albert Lea, Glenville, Northwood, Kensett, Mason City, Hampton, Iowa Falls, Hubbard, Nevada, Cambridge, Des Moines, Indianola, Medora, Liberty, Osceola, Leon, Davis City, Lamon, Eagleville, Bethany, Bridgeport, Pattonsburg, Winston to Cameron.

Vol. 6 of the Automobile Blue Books, published by the Automobile Blue Book Pub. Co., 910 South Michigan avenue, contain complete running directions of this trip.

Oklahoma City, Okla.—Seattle, Wash.

Ada, Okla.—Editor MOTOR AGE—Outline a trip from Oklahoma City to Seattle, Wash., from there to Eureka, Cal., San Francisco, Los Angeles, back to Oklahoma City via the Grand Canyon.—Wm. C. Whitaker.

For the first part of the trip proceed to Packtown, Yukon, El Reno, Calumet, Geary, Bridgeport, Hydro, Weatherford, Clinton, Foss, Elk City, Sayre, Delhi, Erick, Texola, Shamrock, Tex., McLean, Allamore, Groom, Conway, Amarillo, Dalhart, Texline, Clayton, N. M., Mount Dora, Greenville, Des Moines, Dedman, Raton, Trinidad, Aguilar, Rugby, Walsenburg, Greenhorn, Crow, Pueblo, Fountain, Colorado Springs, Pikeview, Monument, Palmer Lake, Greenland, Sodalia, Littleton, Denver, Brighton, Evans, Greeley, Lucerne, Eaton, Ault, Pierce, Nunn, Dover, Cheyenne, Chugwater, Wheatland, Uva, Glendo, McKinley, Orin Junction, Douglas, Glenrock, Casper, Stone Ranch, Johnson's Ranch, Powder River ford, Waltman, Arminto, Lost Cabin, Reid's Ranch, Thermopolis, Kirby, Chatham, Nelber, Worland, Manderson, Basin, Greybull, Lovell, Cowley, Warren, Billings, Laurel, Park City, Columbus, Merrill, Reed Point, Big Timber, Hunter's Hot Springs, Livingston, Bozeman, Belgrade, Manhattan, Old Three Forks, Cardwell, Whitehall, Butte, Anaconda, Phillipsburg, Maxville, Hall, Drummond, Bearmouth, Bonita, Clinton, Missoula, Hudson, Alberton, Superior, St. Regis, Deborgia, Saltese, Summit of Bitter Root divide, Mullin, Wallace, Kelloug, Kingston, Cataldo, Coeur d'Alene, Spokane, Depereck, Reardan, Ravensport, Creston, Wilbur, Almira, Coulee City, Spencer, Waterville, Orofino, Wenatchee, Vantage Ferry, Edensburg, Cle Elum, Baston, Snoqualmie Pass, North Bend, Snoqualmie Falls, Fall City, Campton, Redmond, Kirkland to Seattle.

Seattle, Wash.—Eureka, Cal.

From Seattle proceed to Georgetown, Duwamish, Renton, Omali, Sumner, Ardena,

Tacoma Junction, Tacoma, Lakewood, Olympia, Tumwater, South Union, Grand Mound, Centralia, Chehalis, Cowitz, Toledo, Castle Rock, Kelso, Carrolton, Kalama, Martin's Bluff, Woodland, Woodland ferry across Lewis river, Sarah, Felida, Vancouver, Portland, Ore., Oregon City, Salem, Liberty, Jefferson, Albany, Corvallis, Monroe, Junction City, Eugene, Goshen, Walker, Cottage Grove, Drafh, Yoncala, Oakland, Sutherlin, Edenbower, Roseburg, Myrtle Creek, Riddle, Canyonville, Summit, Wolf Creek, Grant's Pass, Selma, Kerby, Waldo, Monumental, Gasquet, Adams, Crescent City, Requa, Klamath River ferry, Alliance Corner, Arcata, Bayside to Eureka.

Eureka, Cal.—San Francisco—Los Angeles, Cal.

From Eureka drive to Elk River Corner, Field's Landing, Beatrice Station, Loleta, Fortuna, Alton, Rio Del, Pepperwood, Dyer, Fruitland, Harris, Cummings, Laytonville, Willits, Calpella, Ukiah, Hopland, McCrays, Cloverdale, Geyserville, Healdsburg, Windsor, Santa Rosa, Denman Station, Petaluma, Ignacio, San Raphael, Sausalito, San Francisco, Niles, Centerville, Irvington, Milpitas, San Jose, Morgan Hill, Gilroy, San Juan, Calinas, Gonzales, Greenfield, King City, San Ardo, Bradley, Paso Robles, San Luis Obispo, Arroy Grande, Nipomo, Santa Maria, Los Alamos, Los Olivos, Santa Ynez, Santa Barbara, Summerland, Carpinteria, Ventura, Montalvo, El Rio, Camarillo, Calabasas, Hollywood to Los Angeles.

Los Angeles—Oklahoma City

From Los Angeles drive to Bairdstown, South Pasadena, Lamanda Park, Monrovia, Azusa, Glendora, Cucamonga, Etiwanda, Rialto, San Bernardino, Victorville, Barstow, Daggett, Ludlow, Danby, Needles, Yucca, Kingman, Hackberry, Peach Springs Station, Pico Station, Seligman, Ash Fork, Grand Canyon, Grandview, Flagstaff, Winslow, Holbrook, Adamana, Navajo, Houck, Manuelito, Defiance, Gallup, Grants, Paraje, Los Lunas, Peralta, Isleta, Armijo, Albuquerque, Moriarty, Estancia, Encino, Santa Rosa, Puerto de Luna, House, Clovis, Texico, Hereford, Umbarger, Canyon, Amarillo, Conway, Groom, Allamore, McLean, Shamrock, Texola, Erick, Delhi, Sayre, Elk City, Foss, Clinton, Weatherford, Hydro, Bridgeport, Geary, Calumet, El Reno, Yukon, Packington to Oklahoma City.

Vols. 7 and 8 of the Automobile Blue Books, published by the Automobile Blue Book Pub. Co., 910 South Michigan avenue, Chicago, contain complete running directions for the above trips.

Little Rock, Ark.—Los Angeles, Cal.

Little Rock, Ark.—Editor MOTOR AGE—Advise best route from here to Los Angeles.—W. G. Prosser.

From Little Rock proceed to Benton, Lonesdale, Hot Springs, Arkadelphia, Gurdon, Boughton, Prescott, Emmet, Hope, Fulton, Texarkana, New Boston, DeKalb, Oak Grove, Annona, Clarksville, Detroit, Blossom, Paris, Brookston, Petty, Honey Grove, Windom, Bonham, White Wright, Vandalla, Anna, Melissa, McKinney, Dallas, Grand Prairie, Dalworth, Arlington, Handley, Fort Worth, North Fort Worth, Rhome, Decatur, Alvord, Sunset, Bowie, Bellevue, Henrietta, Wichita Falls, Iowa Park, Electra, Oklaunion, Vernon, Chillicothe, Quanah, Childress, Estelline, Newline, Memphis, Jiles, Clarendon, Goodnight, Amarillo, San Jon, Tucuman, Cuervo, Santa Rosa, Encino, Albuquerque, Armijo, Isleta, Peralta, Los Lunas, Paraje, Grants, Thoreau, Gallup, Defiance Station, Manuelito Station, Houck Station, Navajo, Adamana, Holbrook, Winslow, Flagstaff, Wilham, Ashfork, Seligman, Hackberry, Kingman, Tuba, Topock, Needles, Ludlow, Barstow, Oro Grande, Victorville, San Bernardino, Rialto, Etiwanda, Cucamonga, Lodesburg, San Dimas, Vincent, Montebello to Los Angeles.

Aircraft and Motor Car Engine Design

Views from the Standpoint of a Designer and Manufacturer of Both Types

PERHAPS more than to any other one individual, England is indebted to Louis Coatalen for its supremacy in airplane engine design and consequently its measure of supremacy in the air over the western front in Europe. Mr. Coatalen designed the twelve-cylinder Sunbeams which have been campaigned on the speedways in this country and in Europe and has been responsible for many of the leading English developments and the putting of English motor mechanics on a higher plane of efficiency. The following excerpts on a paper presented by him to the Aeronautical Society of Great Britain at the Society of Arts in London are timely:

Mr. Coatalen opened by saying that the British national habit of decrying their own achievements and praising that of foreigners, notably the Germans, was never more in evidence than in the case of the aircraft engine problem; nor was it ever less justified. The case of the latest six-cylinder Mercedes engine to be captured by the allies might be taken by way of illustration. Without water and radiator it weighed $3\frac{1}{2}$ lbs. per horsepower; whereas the latest British water-cooled aircraft engine in the same condition weighed 1 lb. less per horsepower. As regards efficiency, he claimed that England had produced engines that were out and away superior to anything employed in the campaign to date. He pointed out that the belief which appears to obtain in some quarters to the effect that the design and production of an aircraft engine is akin to that of a motor car one is erroneous. Flexibility, silence and cost of production are governing factors in designing a motor car engine; they are practically of no consequence in the case of an aircraft one. On the other hand, weight, a very high brake mean effective pressure, the capability to work at full power for long periods and comparatively great horsepower output—reckoned in terms of hundreds instead of tens—are of prime importance in aircraft engine construction and of comparative unimportance in motor car engine design and production. On this and sundry other grounds, the lecturer detailed, the design of the two types must start from fundamentally opposite points of view.

Value of Racing Experience

"We must not lose sight of the likelihood that the rapid evolution of the aircraft engine during this war and the extraordinarily wide manufacturing experience, which is the outcome of that, will at some future time exercise more than a temporary effect on the design and manufacture of engines for car service," he said. He held that there was a closer analogy between the motor car engine designed and built specially for racing before the war and the wartime aircraft engine than there was between either that type of car engine and the standardized car engine, or, again, the standardized car engine and the aircraft engine of today. For instance, the racing car engine resembles the latest aviation types in that a very high mean effective pressure has to be obtained with it. As the problem in both cases is power for weight and engine volume and not silence and low cost, great freedom is allowed the designer of a

racing car engine as regards piston clearances, valve timing, compression, largeness of valve area, strength of valve springs and so forth, the particulars in this connection approximating much more to aviation than to standard car practice.

The chief desideratum in designing aircraft engines is light weight combined with low fuel and oil consumption per horsepower; also with reliability. Minor desiderata, which already have been largely realized, embrace simplification to the utmost in face of aircraft engines being placed, for the most part, in the hands of semi-skilled talent, whether as regards actually using or merely maintaining them. Hence the demand for that quality which is generally called "fool-proof"; for accessibility, particularly in face of the fortunes of war rendering it necessary on occasions to replace the most vital parts; and suitability of exterior form that the powerplant may be accommodated conveniently in the aircraft and occasion the minimum displacement.

For the first time in the story of motor engineering we are making aircraft engines of high output in series instead of some half a dozen examples at a time.

There are strict limits to the sizes which are practicable for radial engines, whether of the rotary or stationary types. In regard to either vertical or V-type engines, the nature of the particular service to which each individual machine is to be put likewise imposes certain limits on design. Sometimes this may concern the overall length of the engine, particularly when in waging war in the air it is essential to lose the minimum time in altering the attitude of the machine from a diving position to a very steep climbing one. Again, some series of aircraft call for the minimum head resistance but are less imperative as to overall length. Hence six-cylinder types would be suitable for such service, whereas V-shaped varieties might not be.

Hard and Fast Rules Impossible

At this period it is impossible to lay down any arbitrary rules as to any one type of aircraft engine being suitable for the needs of all aircraft service. Those needs are almost as various as are the demands for special varieties of steel and alloys. Moreover, they are likely to multiply with the lapse of time. Aircraft engine design resembles motor car engine production in this particular, that it is all the time a question of compromise. The most successful designer is he who exercises the soundest judgment in weighing a hundred and one factors of the hour and who makes the shrewdest estimate of the value of each.

Continuing, Mr. Coatalen said that in the circumstance of being in mid campaign it was not possible to state definitely the size of aircraft engine which most likely would be adopted as standard in the near future. Experience gained by our aviators at the beginning of the war, together with the demands for the engineer to meet their ever-growing needs, have called for continuous evolution in the design of aircraft, which has inspired corresponding enterprise in regard to engine construction and production.

For short flights the rotary type of engine generally and the air-cooled varieties have shown up to advantage to date, though with them the consumption of fuel and lubricating

oil may be comparatively high; this is offset by the relative lightness of their starting weight. But for longer flights, in connection with which petrol and oil consumption have to be reckoned with as part of the engine weight, water-cooled stationary type engines have proved most suitable.

Speaking broadly, as regards weight per horsepower, progress in the design of the ordinary water-cooled type of aircraft engine has been very marked. In the brief period of two years Sunbeam-Coatalen aircraft engines of this type have been reduced in weight from 4.3 lbs. per horsepower to 2.6 lbs. per horsepower. The design of the engine head, cylinders, the valves and the valve gear is one of the cardinal features of successful aircraft engine production. For water-cooled aircraft engines Mr. Coatalen favors two overhead exhaust and two overhead inlet valves per cylinder, a conclusion which would appear to be justified by the horsepower obtained from engines designed and standardized on this principle. Incidentally, it allows of the best sparking plug position—namely, in the center of the cylinder head in the vertical position. Three valves per cylinder—namely, one inlet and two exhaust valves—have been found practicable for certain varieties of work. He holds that more than four valves per cylinder is an undesirable scheme, as it seems hardly possible to place them so as to leave an even jacket all round each valve without the employment of very complicated gear. We have an example of this in the Maybach (German) aircraft engine, which has three exhaust and two inlet valves per cylinder. In this little water space is provided between the valve seats, while the sparking plug is, besides, set horizontally on the side of the cylinder barrel.

Not only has there been much improvement in cast iron available for cylinders; aluminum alloys employed with knowledge and skill for that purpose have been found, besides, of great advantage, of course, reducing weight per horsepower to an extraordinary extent. Though we are merely on the threshold of realizing the possibilities of aluminum alloys for cylinder castings, it cannot be doubted that within a very brief period they will be recognized as the standard materials for this work, cast iron thenceforward being discarded in favor of them. For two years Mr. Coatalen has standardized aluminum alloy pistons with excellent results.

Air-Cooling Is Favored

It is to note, further, that air-cooling is coming into favor increasingly. The introduction of aluminum alloy in the manufacture of the cylinders has exercised a marked effect in regard to this tendency. In the near future air-cooled engines of greater power may be expected to materialize. Tests on Sunbeam-Coatalen aircraft engines have shown the petrol consumption of 52 pints per horsepower per hour and the oil consumption of .022 pints per horsepower per hour, representing a distinct advantage in consumption by engines using ordinary type carburetors so recently as at the beginning of the war. Nevertheless, there is room for a deal of improvement yet. Whereas at the beginning of the war the maximum mean effective pressure was 106.135 lbs., today it has been increased to 134 lbs. per square inch measured from the brake horsepower and, in some cases, actually through the reduction gear.



The Motor Car Repair Shop



Proper Method of Cutting Paper Gaskets

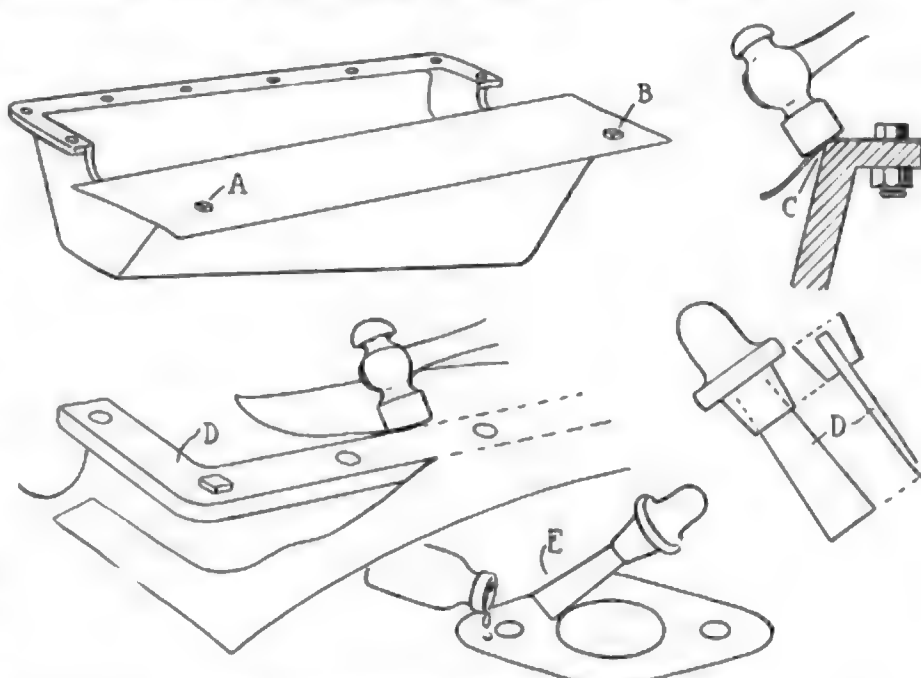
IN REMOVING the cylinder block from the crankcase the paper gasket is frequently torn from adhering to either the crankcase or cylinder flange. If the gasket is ruined completely a new one must be made and the proper method of carrying this out is shown in the accompanying illustration. The things needed consist of a sheet of good wrapping paper, a ball pein hammer and a bottle of shellac. About the only place where paper gaskets are used on motor cars is the joint between the cylinder block and crankcase, and under the cover of the gearbox.

No matter how irregular the shape of the gasket might be, it can, if the following instructions are carefully followed, cut with comparative ease and an absolute fit assured.

The first step is to scrape all of the remnants of the old gasket off the flange of the crankcase, assuming that it is desired to cut a gasket for this particular part of the engine. In scraping off the old gasket it is very necessary to get all of it off, otherwise there will be high spots on the flange which will prevent the new gasket from lying smoothly. An ordinary scraper such as used by cabinet makers will do for this particular part of the job. Now cut the wrapping paper to a little larger size than that of the required gasket and lay it upon the crankcase as shown in the upper part of the illustration. Hold it in place with the left hand at one of the corners and with the ball or pein end of the hammer tap out the hole into which the holding-down bolts of the cylinder block pass. It is only necessary to strike light blows for this and the hammer will do a nice job of cutting out the hole.

In Disk Form

The paper cut out of this opening will be in the form of a disk and can be pushed through the hole with the finger. One of the bolts of the crankcase is now passed through the hole in the paper and flange and a nut put on the other end, thus holding the paper firmly to the surface of the flange. This bolt is shown at A. Exactly the same thing is done at the other end of the crankcase and here the bolt is shown by B. These two bolts will prevent the paper from shifting and the gasket itself can now be cut. Before using the hammer it is a good plan to rub over the surface of the paper with the fingers along the lines where the gasket is to be cut. If the fingers are dirty, so much the better, as this will leave a black line on the paper around the flange, giving the exact size and shape of the latter. This makes an ideal pattern and no difficulty will be ex-



Sketches to illustrate proper method of cutting paper gaskets

perienced in following it with the hammer, although really the sharp edge of the crankcase is the guide for the hammer. This cutting edge is shown at C, as well as the angle at which the hammer is to be held.

At D is shown the way the gasket will look while it is being cut, and if the work is properly carried out, it will be surprising how nicely cut the edge will be and the gasket will conform exactly to the shape of the crankcase flange. The hardest part of the work is to hold the paper in place while the gasket is being cut, but if the holes described above are first made and the bolts inserted, no difficulty should be experienced.

When the gasket has been cut it should be given a coat of shellac and allowed to dry for a short while. There is a right way and a wrong way of applying the shellac. One way is to pour a little shellac on the gasket and spread the liquid over the paper surface with the fingers. While this will do the job, the fact remains that shellac is anything but pleasant when it comes in contact with the fingers and begins to dry. A much better and pleasanter way of handling this substance is to make a wooden stopper for the shellac bottle and into the lower part of the stopper cut a slot for fitting a wooden spreader as shown at D. This spreader is made with a feathering edge and cut to such a length that it will reach to almost the bottom of the bottle. When it is de-

sired to use the shellac, the bottle is inverted for a moment with the stopper in place and then the latter removed and smeared over the gasket as shown at E.

Rust in the Springs

If the average car owner would only bear in mind how important it is to keep the springs lubricated, surely many mysterious squeaks would disappear, to say nothing of the easier riding of the car and the increase in the mileage of the fuel. If the springs are rusty and dry the leaves will stick together and every time the car strikes a bump, the engine has to lift the entire weight of the car in going over it. This means more work for the engine and consequently more consumption of gasoline. If, on the other hand, the springs are kept well oiled, the body of the car will be carried along in a horizontal line with very little vertical action because the spring leaves take care of this by properly sliding upon one another. In other words, the spring action takes place so quick that the body will literally float along due to its inertia. The joints of the links connecting the springs to the frame should also receive proper oiling frequently. When doing this it gives the owner a chance to inspect the nuts on the spring clips which have a tendency sometimes to work loose. These nuts must by all means be kept tight, for otherwise the whole strain comes upon the bolt which holds the spring together at the center.



The Readers' Clearing House



Garage System of Accounting

HEREFORD, Tex.—Editor Motor Age—Give us some suggestions as to the best system of records, checks and books to be kept for a garage employing ten people and storing fifty cars with a shop in connection for repair work on cars and tires.—Ford Garage.

Culver, Ind.—Editor Motor Age—Give a form of bookkeeping for garage supplies that would give the cash and charge accounts; price of each, cost and profits and amount on hand, etc.—Ralph Cook.

We would suggest the system of accounting described below for keeping tab on the business of both of your garages.

In the vulcanizing department you should have tags to attach to work as it comes in, and these tags should carry the owner's name and address, telephone number, tire and tube number and make, when received, when promised and charge for work. When the work is delivered to the customer a regular sales slip should be made out, the same as for a sale from the accessory department. This holds true whether the sale is for cash or on credit. These tags should be serially numbered

and the end of the tag should be torn off and given to the customer as an identification, or a receipt for his property.

In the accessory department you should have inventory cards, which may be purchased from Motor World, 239 West Thirty-ninth street, New York, at the following prices:

4 by 6	5 by 8
100....\$ 1.00	100....\$ 1.25
1000... 9.00	1000... 12.00

You should have also standard sales slips for recording both charge and cash sales and in addition you might have an order book or an order card file in which you might keep track of goods ordered but not yet received.

In the car storage department you should have a sales slip similar to the ones used in the other departments on which would be recorded the sale of gasoline, oil, etc. In addition you should have a register book or some card system for showing

when cars come and go, a tag for transients so that, when a stranger brings a car in, the car will be tagged and the customer will receive a coupon without which he cannot obtain the car. This card should have a space on it for directions regarding washing and polishing, filling with oil and gasoline, etc., and also columns for recording the charges for these services.

Every member of the organization should have a time card, and it is desirable to have a time clock so that there will be no mistakes or misunderstandings regarding when a man comes to work and when he leaves. A satisfactory type of card is described below.

You should have a bill-head or statement for recording the number of charge sales to each customer, and this should be presented at the end of the month.

Figs. 1 and 2 show two sides of the work card. The front is made out in triplicate. One of these cards is used every time a

NAME <u>John Smith</u> Date _____ Job No. <u>331</u>	
Home Address <u>Cedar Ave</u> Business Address <u>50 High St</u>	
Phone <u>293M</u> Home Phone <u>Main 62</u>	
MOTOR NO. <u>46854</u> LICENSE NO. <u>A 3443 NY</u> SPEEDOMETER <u>27585</u>	
INSPECTION MOTOR Valve tightness Valve adjustment Carburetor adjust. Fuel strainer Vacuum system Spark plug points Breaker points Spark timing Carbon deposit Roddler camshaft Fan belt Cutout operation Voltage regulation Tight connections Good insulation Starter operation Battery condition Rev. oil in motor SLIPPER Cleaning Adjustment Lubrication CHARGE Lubrication Adjustment DRIVING MECHANISM Universal lubricat. Adjust. Bevel gears Lubrication Brake adjustment Wheel bearing adjust. Wheel bearing lubricat. Wheel alignment Steering gear adjust. Steering gear lubricat. Headlight focus Tire condition Speedometer testing Spring lubrication All nuts and bolts tight	DIRECTIONS — Remove Carbon — Reset Valves — Take up rods — Clean breakers and fill with new oil — Recharge battery — 4 new spark plugs
When promised <u>12/30/16</u> Test by <u>H. Brown</u>	
Work authorized <u>John Smith</u> Work accepted <u>John Smith</u>	

Fig. 1—The work card gives complete information concerning the customer and his car and inspection column

No.	Article	Requisition	Date	By	Price	Total
12	Patrol Range	701	12/28/16	Jack	25	3.00
1-	Bal. machine	722	12/28/16	Red	12	12
2	Bal. cyl. Oil	723	✓	✓	60	120
	Recharging battery	725	✓	✓		100
4	Star spark plugs	735	✓	✓	100	400

Fig. 2—The reverse side of the work card contains a complete record of labor and material used

customer requires work done on his car, whether the work is free inspection service or regular repair work.

The name of the customer (John Smith), his home address and phone number are placed on the card. All this information is necessary in order that he may be reached without loss of time.

The date and the number of the job are also placed on the card; the job number, as you probably know, is a simple means of identifying that particular card. All the jobs which come into your shop after installing this system will be numbered from 1 up consecutively.

The engine or car number, the license number and the speedometer reading should also be placed on the card.

The license number affords a ready means of identification when the car is in the shop or at any other time, and it is particularly advantageous in a large shop. Furthermore, if the customer is a stranger and should take his car out without paying his bill it would enable you to trace it by writing to the secretary of state. If the customer is a transient it enables you to obtain his address from the secretary of state in case he only gives you his name—or possibly not even that, if the job is a small one—and thus you can send him a letter from time to time so that whenever he is in your neighborhood he will be likely to come to your garage for any further work.

Engine Number Is Necessary

The engine number is a necessity as an absolute means of identification in case the car is sold and the license number is changed, or in case the numbers are damaged or prove defective. This has been the case thousands of times in New York state in the last year. At the present time a license number in this state is a poor means of identification.

The speedometer mileage should be recorded so that any mistakes by the owner regarding the mileage of the car may be verified. For example, suppose that you did some repair work and after two weeks the car had given trouble after running 200 miles. If the speedometer showed 1000 miles this would naturally put a different complexion on the matter.

There is a column at the left of the card for service inspection work, and this should be checked. It is not necessary to copy this list, but this is merely a suggestion and you may add or subtract items as you see fit. This list should be helpful in not only performing any free inspection service which you may be called upon to do in connection with new cars, but also may be used for regular inspection work, which many owners now have done. We do not know whether you are doing any of this or not, but you will find that many owners will be glad to pay you, say, \$5 for a monthly inspection of their car.

Very full directions regarding the work to be done on the car should be written in the spaces allotted for this, and at the bot-

Fig. 3 is a requisition card for obtaining new parts. It contains the following information:

- Job No. 831
- Article Piston Rings
- No. 12
- Price 25
- Approved by J.E.H. Foreman

Fig. 4 is a daily time slip for worker. It includes fields for Name (Ted White), Date (12/26/17), and a table for recording time.

Job No.	Owner	Work	Start	Stop	Time	Rate	Total
831	John Smith	Cleaning & grinding valves & oil work	10	10:30	30	40	2.0
799	Ed Jones	Setting rear axle	10:30	6	7:30	40	3.00

Upper—Fig. 3—Requisition card for obtaining new parts. Right—Fig. 4—Daily time slip for worker. Fig. 5—The mechanic is paid according to the hours recorded on the time card

tom the date when the work is promised should be inserted.

The signature of the owner authorizing the work should be obtained in every case so that there can be no dispute as to what was ordered when the time comes to pay the bill. If after this work has come in, it is found that there are several additional things to be done, the owner may be called on the telephone and the permission obtained; but, in addition, it is wise to have his consent in writing, and consequently these additional items should be placed on the work card and mailed to him for his signature.

After the job is completed it should be tested by someone, usually the foreman, and when the car is delivered the owner should signify that everything has been done to his satisfaction by signing at the bottom of the card.

When the job is started the original should be filed in the office, a duplicate should be given to the owner, and another carbon copy, which should be on card-board, goes to the shop to be attached to the car. The signatures on the bottom of the card should appear on the office copy.

Fig. 2 shows the reverse side of the card, and this may be either the copy kept in the office as a matter of record or the copy which goes on the car in the shop; or it might be wise to have this information on both copies, according to circumstances.

All work done on the car is recorded on the card. For example: The first job listed was done by "Bill" on Dec. 26 and was grinding the valves. He worked from 9:30 to 2:30, which was 4 hrs., and at 60 cents an hour the total was \$2.40. "Jack" and "Ned" also did work on this car.

The lower half of the card records the material used, the first item listed being twelve piston rings, which were obtained from the stockroom by "Jack." They

cost 25 cents apiece, which brings the total to \$3.

If your shop is a small one the complete record of time and material may be kept on the back of the work card attached to the car. This work should be done by the foreman, superintendent, or, in a very small shop, by the owner himself. For example, when "Bill" starts grinding the valves the foreman would get this card, writing down the dates, "Bill's" rate (60 cents), the starting time (9:30) and, later, the finishing time (2:30), the total time (4 hrs.), and the cost (\$2.40).

Likewise, when "Jack" wants twelve new piston rings he goes to the stockroom and gets them, and records the fact on the card, as shown.

Keeping the Record

Inasmuch as this card is subject to frequent handling and is likely to become dirty, it is advisable to make these entries on the work card in the office instead. In a small shop this card might be kept on a desk in the shop.

In a larger shop the full record would be kept on the card in the office and would be done by a clerk.

The clerk would be informed as to the work done on the car and the material used by special slips. Thus, the record of "Jack's" purchase of twelve piston rings would be obtained as follows: "Jack" would get a requisition blank, Fig. 3, and fill it out, as shown. Then he would take it to the foreman for his approval, who would put his initials on it. Without this signature the stock boy or clerk would not give "Jack" the rings. Then "Jack" takes the slip to the clerk who has charge of the stockroom and obtains what he desires. At the end of the day this slip is forwarded to the office and the next morning the clerk who does the bookkeeping would transfer this data to the work card.

1/8" Spaulding
Blank open end 7/8" long porcelain type

QUOTED BY						1	2	3	4
LIST PRICE						100	100	100	100
DISCOUNT						40	45	40	45
NET COST						57	55	54	49
SELL PRICE						100	100	100	100

RECEIVED			ON HAND			SOLD			RECEIVED			ON HAND			SOLD		
DATE	FROM	QUAN.	DATE	FROM	QUAN.	DATE	FROM	QUAN.	DATE	FROM	QUAN.	DATE	FROM	QUAN.	DATE	FROM	QUAN.
July 1		24	70		64												
			58	11/16	16												
			46	11/29	16												
July 3		24	70														

Fig. 6—The inventory card shows how much stock there is on hand at all times

In case it is ever necessary to look up these requisitions, the work is facilitated by filing them according to their numbers. Consequently it is necessary to put the requisition number on the work card. Thus to find the requisition which was used in obtaining the piston rings, it is simply necessary to look at the work card, which shows that the number is 701.

The record of the labor is kept by time slips, one of which is made out by each man each day, Fig. 4. It has the name of the man, which in this case is Ned White, the job number 831, the owner's name, the work, starting, finishing and elapsed time and the rate and the total charge.

A Full Day Record

This gives a full record of what Ned White did all day long on Dec. 26. His first job was working on John Scott's car, which is identified by job number 831, and the work was cleaning the crankcase and putting new oil in the motor. He started at 10 and stopped at 10:30, the elapsed time was 30 min., and at 40 cents an hour the total is 20 cents. The rest of the day was spent in working on the car identified by job number 799 belonging to Jones, and was consumed in taking the rear axle apart. The elapsed time was 7½ hrs. and the cost \$3.

The different employees are paid according to the record on the time card, Fig. 5, which gives the man's name, his rate and the week, which in this case is Dec. 17 to 23. He worked 9 hrs. every day except Saturday when he was 2 hrs. late; total 51½ hrs., and the amount is \$10.35.

For keeping track of your stock, you should have inventory cards such as the one shown in Fig. 6. These may be purchased from A. Bobbe & Co., 320 West Superior street, Chicago, and cost, 4 by 6, in 100 lots or more, 85 cents, 1000 lots or more, \$3; 5 by 8, in 100 lots or more, \$1, 1000 lots or more, \$9.50.

The method of filling this card out is shown in Fig. 6. It is a 7/8-in. spark plug blank open end, porcelain type, and is sold by four different jobbing concerns. The prices as quoted by the different concerns are also given, as well as discounts, net cost and selling prices.

When a quantity of spark plugs is received, the date, the number of the concern from whom received and the quantity are recorded; this number, added to those already on hand, gives the total number on hand, and when they are sold the quantity is subtracted, the date put down and the number on hand is changed, as shown.

The other forms, illustrated, you will have to have made specially.

Terminal Voltage of Storage Battery

Chicago—Editor MOTOR AGE—What is the terminal voltage of a 6-volt 60-ampere battery, specific gravity reading 1.185 at 10 deg. F.?

2—Publish diagram for recharging Ford magnets after they have been removed from car; these magnets have ¾-in. face. What size wire should I use, and how much? What should be the size of the pole pieces?

3—In recharging old magnets is it necessary to determine the N. and S. pole and place them in charger according, or does this make any difference?—S. P. Baley.

1—Approximately 5.1 volts. A battery in this state is very nearly discharged and each cell will probably not read over 1.7

Inquiries Received and Communications Answered

Ford Garage.....Hereford, Tex.
 Ralph Cook.....Culver, Ind.
 S. P. Baley.....Chicago
 Harry Dickinson.....Walla Walla, Wash.
 J. S. Whittinghill.....Evansville, Ind.
 A. S. Harrison.....Des Moines, Iowa
 C. H.....Dayton, Ohio
 Clarence L. Nickerson.....Elm, Neb.
 V. H. McDonald.....Wichita, Kan.
 Jack Sacks.....Chicago
 W. A. Meloy.....Argos, Ind.
 R. W. Manahan.....Powhattan, Kan.
 F. E. Hodges.....Garland, Tex.
 H. G. Kroeger.....Louisville, Ky.

volts. If the gravity of a storage battery is found to be below 1.215 the lamps should be used sparingly until the specific gravity is restored to at least 1.250.

2—To make a satisfactory magnet recharger requires some very accurate construction insofar as the size and amount of wire to be used is concerned. It is also a matter of doing much experimental work, and no definite information can be given without having built a recharger which it is known will do the work absolutely satisfactory. MOTOR AGE hopes to give the detailed construction of a charger for magnets in an early issue.

3—The N pole of the magnet to be charged must be placed upon the S pole of the charger, because one of the first laws of magnetism states that like poles repel and unlike poles attract.

REBUILDING AN OLD MAYTAG Speed of Reconstructed Car of Reader Is Problematical

Walla Walla, Wash.—Editor MOTOR AGE—Who put out the Maytag?

2—What h.p. has the Atlas motor in same? 2—How would this car be cut down as a speedster?

4—In overhauling, have put on the rear 35 by 4½ tires and 34 by 4 in front. It had originally 37 by 4 all around. Would this lower the speed very much and would it have more power to be noticeable?

5—Would, say, a D.R. 6 Bosch magneto furnish enough spark for two plug ignition with any advantage over the ordinary system, or would it be better to use two systems coils and battery and Bosch for two plug ignition?

6—Would you advise using extra oiling system?

7—About how many miles per hour would same be capable of providing it is in good shape?

8—How does the Atlas motor compare with other motors as installed in touring cars for power and speed?—Harry Dickinson.

1—Mason Motor Co., Waterloo, Iowa.

2—Roadster, 20 hp.; touring, 26 hp.

3—A study of the designs showing touring cars of different makes remodeled into speedster types as published in this department during the past months will suggest ideas.

4—Not greatly.

5—The complete double system is the better.

6—Yes, for continued speed.

7—Impossible to hazard an opinion.

8—The engine in the Maytag compared favorably with others of its time.

DETERMINING SIZE OF CARBURETER Is to Some Extent Governed by the Displacement of the Engine

Evansville, Ind.—Editor MOTOR AGE—Give the law that governs the relation of the size of a carburetor to the size of the cylinder. To illustrate: for a cylinder 3 in. in length by 2 in. in diameter, what size of carburetor would be required?

2—Would the small motorcycle Schebler carburetor be small enough?—J. S. Whittinghill.

The carburetor size will vary with the piston displacement, but it is a difficult matter to give any definite formula applicable to all makes by which accurate results may be obtained, as to just how the size shall vary. Most carburetor companies experiment in order to obtain the proper size carburetor and nozzle. The volumetric efficiency of the engine has much to do with it also.

The Wheeler & Schebler company tries to maintain a velocity of about 10,500 ft. per minute at the carburetor throat, with the engine under full load at 1000 ft. per minute piston speed.

Although the displacement of the engine is to some extent a guide to the carburetor size necessary, it does not always work out that the size is in direct proportion to the displacement. For example, a 3 by 4-in. engine of a certain design and make may require a 1-in. carburetor, while another engine of the same dimensions may do the work just as well with a $\frac{3}{4}$ -in. or even a $\frac{5}{8}$ -in. carburetor. The make and type of carburetor enters into the matter also.

A well-known carburetor company uses the following formula for determining the throat size:

$$\text{Square root of } \frac{D^2 L N}{150,000}$$

where D is the bore of the engine in inches, L the stroke in inches and N the maximum r.p.m. at which the engine will be run when driving the car on high gear.

In determining the nominal outlet size of the carburetor the denominator 70,000 is substituted in the above equation. Thus an engine with a maximum speed of 2000 r.p.m. and with a bore of 4 and a stroke of 5 in. would have a $1\frac{1}{2}$ -in. carburetor

$$\frac{16 \text{ by } 5 \text{ by } 2000}{70,000} \text{ equals } 1.517 \text{ or about } 1\frac{1}{2} \text{ in.}$$

The equation above gives, through the carburetor throat, an actual velocity of between 33,000 and 35,000 ft. per minute under wide open throttle and maximum engine speed.

2—The small Schebler carburetor used for motorcycles ought to be about right for this, although it is capable of handling engines of considerable more bore and stroke.

HOW IGNITION SYSTEMS DIFFER

Two Systems of Ignition on Pierce-Arrow Explained

Des Moines, Iowa—Editor MOTOR AGE—Explain the difference of Dual, Duplex and Double Ignition.

2—How does the Pierce-Arrow use the Dual, Double?—A. S. Harrison.

1—In the dual system of ignition there are two sources of current and one set of plugs, either source of current being available at any time. In double ignition there are two sources of current and two sets of plugs but only one set sparking while the engine is running. Either set of plugs may be used with its current source operating. The duplex system combines a battery circuit with a high-tension magneto arranged so that while the magneto circuit is complete in itself, the battery circuit includes the battery and coil which acts in conjunction with the magneto. The same set of plugs is used for the magneto and battery both. The battery side of the outfit is not intended to be used as a separate ignition system, but merely as

an auxiliary to the magneto to insure easy starting by cranking.

2—The Pierce-Arrow has two ignition systems, each entirely independent and each having its own set of plugs. The first system employs a Bosch high-tension magneto. The second system draws its primary current from the storage battery. This current is distributed by the commutator to the master vibrator and unit coils where it is stepped up to high-tension secondary and then to each spark plug. Either of these systems may be switched on at will, or they may be used together.

Saxon Ammeter Wiring

Dayton, Ohio—Editor MOTOR AGE—Publish a diagram showing the method of connecting the ammeter on the new 1917 Saxon four. A Wagner two-unit instead of the Detroit now is used.—C. H.

This is shown in Fig. 7.

Chalmers Engine Misses

Ellis, Neb.—Editor MOTOR AGE—My Chalmers 6-30, 1917 model, misses on the first three spark plugs. The last three fire all right, but the first three get dirty, soot up and miss and will not fire until you take them out and clean them; then they work for a short time. What is the trouble?—Clarence L. Nickerson.

Although your description is not detailed enough to give a very definite clue, we would surmise that you are using an improper weight of oil. Try a lubricant with heavier body and see if the trouble is not eliminated.

Antimony in Battery Plates

Wichita, Kan.—Editor MOTOR AGE—In the lead plates for storage batteries what is the correct proportion of antimony to lead?

2—What is the correct proportion of sulphuric acid to red lead in the positive plates and of acid to the cell charge in the negative plates?—V. H. McDonald.

1—This varies with different makes of batteries but usually runs from 6 to 8 per cent.

2—Inasmuch as the formulas of each concern are different and patented, it is not possible to give this information. If one concern gave out its formula the latter could be used by its competitors to good advantage. Thus the battery makers are reluctant to give out this information. Furthermore, this information would not

do the average person much good for no one outside of a manufacturer can successfully mix material and paste the plates properly.

DRY CELLS HELP STORAGE BATTERY

Method of Wiring for Auxiliary Ignition System

Chicago—Editor MOTOR AGE—In a battery starting, lighting and ignition system all in one unit, is there any way of connecting some dry cells to the ignition in case the storage battery runs out?

2—If the platinum points in a magneto are too close or too far apart, what takes place in the magneto that stops the spark?

3—I have noticed that on some starting, lighting and ignition systems the positive side of the battery was grounded and on some the negative side was grounded. Which is the best to ground?

4—Could you explain to me the difference between alternating and direct current?

5—How is a low-tension current stepped up to a high-tension current?

6—I have seen storage batteries with four connections on them. Is this better than the two-connection battery and how are the four connections connected?—Jack Sacks.

1—In Fig. 9 is shown a method of connecting dry cells to furnish current for ignition in case the storage battery becomes exhausted in such a system as you mention. Usually in a system of this kind the current for ignition is furnished by the storage battery to begin with, and after the engine is started the generator supplies current when it has reached a certain speed. When the dry cells are used, the current is furnished in the same manner as though it came from the battery. The generator may then be used to charge the battery. The switch shown at A closes the circuit when the storage battery is used, and B when the cells are used. On some systems A and B are so arranged that they control both the ignition and the circuit between the generator and storage battery. Thus when switch B is closed and ignition is being supplied by the cells, switch A can be so arranged that contact is made at C, closing the circuit between the generator and storage battery, in which case the latter will be charged. This does not mean that the storage battery should be removed from the circuit.

2—If the points are set too close, the secondary does not have a chance to build

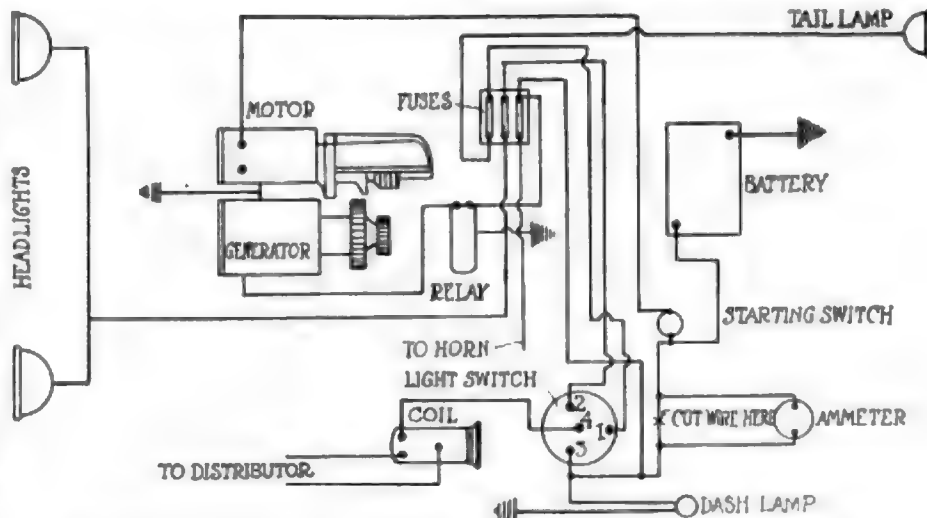


Fig. 7 Diagram showing method of connecting ammeter on new 1917 Saxon four, using Wagner two-unit

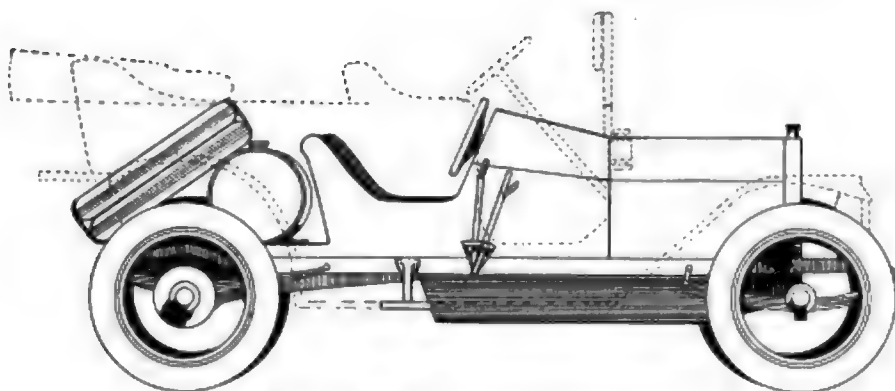


Fig. 8—Rebuilt 1910 Cadillac touring car, keeping in mind the cost

up sufficiently in voltage to produce a spark. When too far apart, the resulting high tension current will cause undue wear of the platinum points, because the latter will come together with more force than necessary. This will eventually make the points stick from becoming pitted and the magneto will cease to fire.

3—In the majority of cases the negative side of a storage battery is grounded, although it really makes no material difference whether the negative or positive side is grounded, as far as the flow of current is concerned. For electrical reasons, the negative side of the battery ought to be grounded and you will find this to be the case in the installation of most electric systems.

4—An electric current is said to be alternating when it flows rapidly to and fro in opposite directions. The number of alternations per second is known as the periodicity. For instance, a current that alternates five hundred times a second would be said to have a periodicity of 500. In a direct current, the flow is in one direction only. Magneto generate an alternating current, while an ordinary dry cell or storage battery generates a direct current. There are, of course, other means for producing each type of current.

5—A low-tension current is stepped up to a high-tension current as shown in Fig. 10. This shows the basic principle upon which spark coils work. The core A consists of a bundle of soft iron wire surrounded by the primary wire B. The latter is connected to a source of current, such as a storage battery, and to the vibrator C, as shown. The other wire from the battery is connected to adjusting screw D. At E is shown a switch for opening or closing the circuit. The high-tension wire F consists of a great many turns of fine wire wrapped around and insulated from the primary. When the switch E is closed the current flows through the primary wire, the core A becomes magnetized and draws the vibrator C toward it, thus breaking the contact with screw D at G. The moment this takes place the circuit is broken and the core A loses its magnetism, thus releasing the vibrator which will then again make contact with screw D at G. But the moment this contact is made again, the core will once more become magnetized and

draw the vibrator towards it. This action goes on and is repeated so fast that the vibrator buzzes. When this vibration takes place, a current is induced in the secondary wires F by "induction" and intensified to such a pressure or voltage that it will jump the gap at H. The latter may, for convenience, be called the gap at

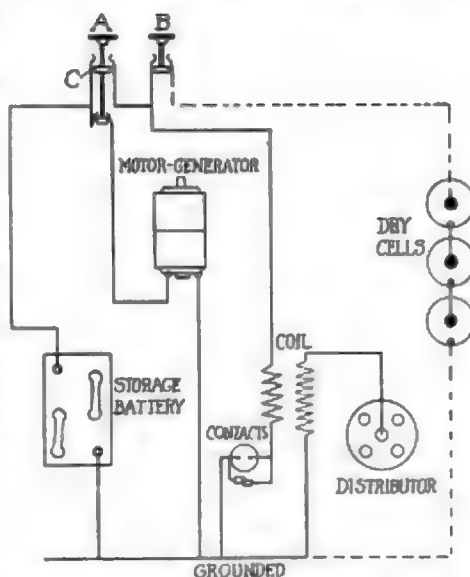


Fig. 9—Method of connecting dry cells in case storage battery becomes exhausted

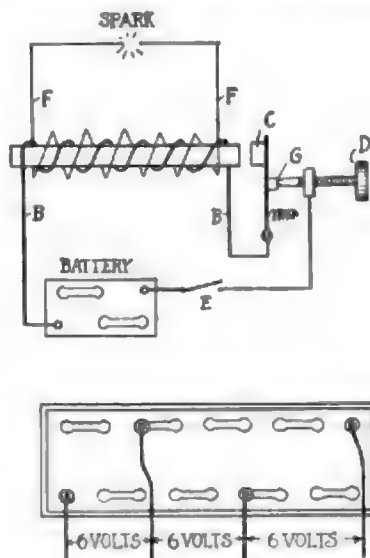


Fig. 10—How low-tension current is stepped up to a high-tension current

the spark plug points. The current which jumps this gap is known as a high-tension current.

6—You probably have seen what is known as a twelve-cell 24-volt battery, which could be made into three separate circuits of 8 volts each. This would mean that the battery would have two extra terminals on it, as shown in Fig. 10, together with the regular terminals on each end of the battery.

HOW TO DROP STEERING WHEEL

Rebuilding 1910 Cadillac Touring Car into Speedster

Argos, Ind.—Editor MOTOR AGE—Would like to rebuild my 1910 Cadillac touring car into a speedster as cheaply as possible. Give sketch showing how car would look when rebuilt.

2—What would be the approximate cost of rebuilding?

3—How can the steering wheel be lowered?—W. A. Meloy.

1—An illustration showing how the car might be rebuilt is shown in Fig. 8.

2—This is hard to say, because it will depend upon how much of the work you expect to do yourself. If you follow out the design shown, the cost would be about \$100. This does not include tires on the back of car, however.

3—To do this you must fit wedges of wood under the frame bracket and also the bracket on the dash or floor boards. In all probability you will have to drill new holes in the frame for the steering post bracket because the latter will be swung at a steeper angle. There are many parts houses which can furnish you brackets for this and it is only necessary for you to state to them the angle at which you expect to place the steering post and the diameter of the latter.

OPERATION OF FORD TRANSMISSION

How Lost Magnetism May Be Restored to Magneto Magnets

Powhattan, Kan.—Editor MOTOR AGE—How does the Ford transmission operate, and show diagram of how power is transmitted through it?

2—How does the Ford magneto operate?

3—Has it magnets?

4—How is a magnet charged? What size wire is used and how wound?—R. W. Manahan.

1—A sectional view of the Ford planetary transmission is shown in Fig. 12. The driven gear is shown at D. By pressing the low speed pedal a brake is applied to the drum BB, and by doing this the gear F is held stationary and the pinion P rolls upon it. The pinion P1 causes the gear B to turn slowly, which constitutes the slow speed. For high speed, the whole mechanism is locked by means of the clutch plates in drum C, and the whole unit turns around acting as an additional flywheel. None of the internal parts of the transmission turn around when the car is in high gear. For the reverse, a brake band is applied to the drum V. This holds the gear L stationary and the pinion K rolls upon it and the pinion P1 causes B to move in the reverse direction.

2—The Ford magneto and its various parts is shown in Fig. 11. This magneto is of the revolving field type, which means

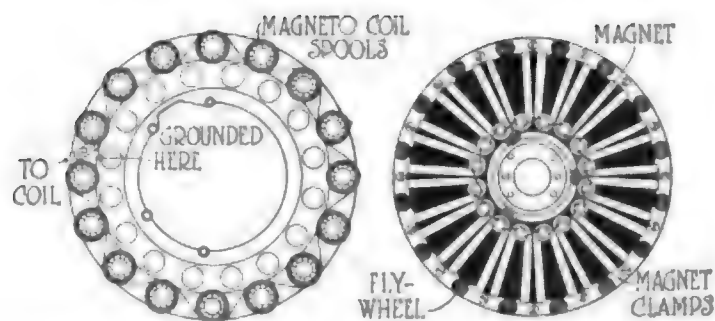
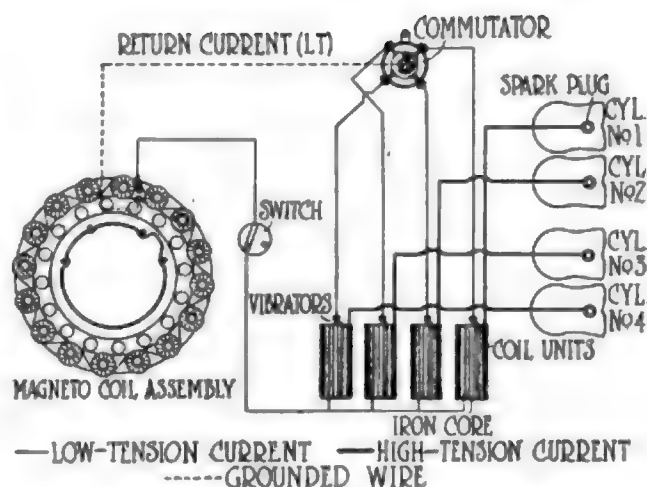


Fig. 11—Ford magneto and its various parts



that instead of having the magnets or field-producing element remain still and the coils and armature revolve, just the opposite takes place, that is, the field revolves and the armature remains still. In the illustration is shown the flywheel to which are attached the magnets, by means of clamps. This is the revolving element, while that at the left, consisting of the windings, is the stationary part. The stationary part is fastened to the cylinder block, while the revolving part is attached, as before stated, to the flywheel. There are sixteen coils, all connected, and as the magnets revolve past them, there is induced within the coils a current of low voltage. As will be seen, one end of these coils is connected to a common wire which is grounded, while the other end is led to the coil on the dash where the current is stepped up to a high voltage suitable for ignition.

Ford Wiring

The illustration also shows the Ford wiring, and it will be noted that there are two wires leading from the magneto, one going to the switch and the other to the ground, shown by the dotted line. The magneto current will flow through the switch and through the coil with which the commutator arm is making contact. That is, if the commutator arm is on No. 3 segment then current will flow through the low-tension winding of coil No. 3, then through the commutator and to ground and then back to the magneto. In passing through the low-tension winding of the coil the current is interrupted and a high-tension current is induced in the secondary of the coil. This high-tension current passes immediately to the spark plugs, where it is grounded. The circuit is thus complete, inasmuch as the secondary of the coil is grounded also.

3—Yes, sixteen of them, as the illustration will show.

4—In order to charge magneto magnets direct current is used. With an alternating current it will be necessary to use a rectifier of some kind. This means that the alternating current entering the rectifier will come out as a direct current. As far as the actual charging of the magnets is concerned, this is done by means of an electro-magnet. This apparatus comprises two coils of wire mounted upon a yoke and with suitable pole pieces at the top upon which the N and S poles of the mag-

nets to be charged are placed. The N pole of the magnet is placed upon the S pole of the charger when the operation of charging the magnets is carried out. Current is allowed to flow for a very short time only, as there is danger of overcharging the magnets if carried on too long.

Ford magneto magnets can be charged without taking them from the car and this was fully described in the Clearing House columns of MOTOR AGE issue of May 24.

The size and kind of wire to use in making a magnet recharger, as well as the quantity to use, can only be arrived at after much scientific calculation and experiment. This subject was extensively dwelt upon in the clearing house depart-

ment of MOTOR AGE in the issue of May 31.

American Scout Made Speedster

Garland, Tex.—Editor MOTOR AGE—Publish a sketch of an American Scout roadster 1914 model to be made into a speedster using the same radiator, hood and wheels and leaving the fenders off; also lowering the steering wheel as much as possible and have the cowl made back on it as much as possible; also have the seats, gasoline tank and tool compartment set as low on the frame as can be made.

2—Will there be any danger of the new steam cars shaking joints loose so steam can escape when going over rough roads, or are they all welded together?—F. C. Hodges.

1—A sketch prepared following your ideas will be found in Fig. 13.

2—No. Welding is resorted to wherever possible and all connections are firm.

Valve Timing on Flanders Engine

Louisville, Ky.—Editor MOTOR AGE—Would it increase the power to set the valve timing early on a Flanders 20 motor, say, three to four teeth ahead, on timing gears?—H. G. Kroeger.

It may do so slightly, but you would also find that you could not throttle down the engine quite so well as with the present setting. In changing the valve timing, it is a good plan to set the timing gears one tooth at a time and then try out the engine to ascertain whether or not the change is too radical. More power can be obtained from the engine by fitting a camshaft, the cams of which have a higher lift, thus holding the valves open for a longer period. Unless you are skilled in this kind of work, you had better not attempt it as it requires very accurate design and mechanical construction.

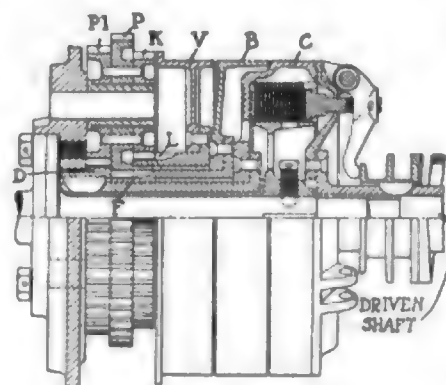


Fig. 12—Operation of Ford planetary gears

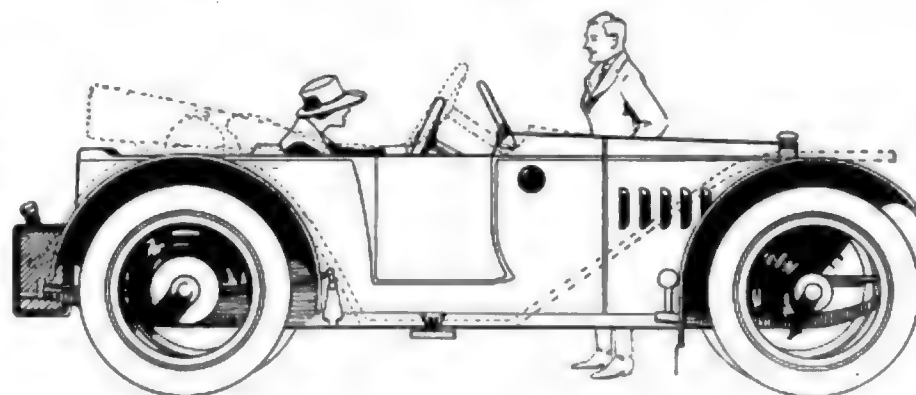


Fig. 13—Sketch of American scout roadster, 1914 model, made into speedster

MOTOR AGE

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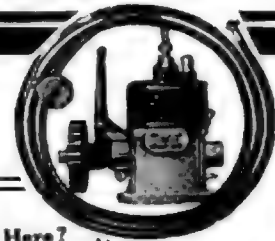
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ANNOUNCEMENT

Next Week—Permanent Road-Making Materials. The subject of material for road construction is timely just now inasmuch as the government has ruled that this class of freight shall take preference over all other. Further, the necessity for permanent roads is acknowledged now as never before, for it is the all-year road that is necessary for military use. First the subject of brick roads will be dealt with and in a later installment concrete and other forms.

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Equipment of Cars in Chicago Derby—250-Mile Event

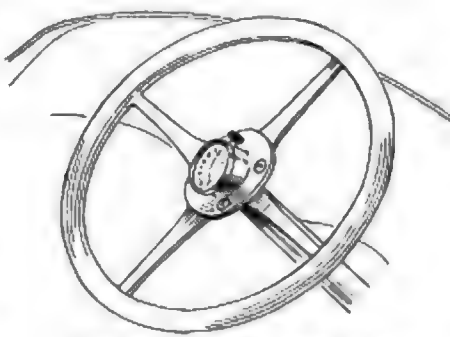
No.	Car	Driver.	Cyl.	Bore	Stroke	Disp.	Flags	Carburetor	Igni- tion	Tires	Size	Wheel- base	Oil
1	Frontenac	Chevrolet	4	3.87	6.37	298.00	K.L.G.	Miller	Bosch	Goodyear	32x4 1/2	104	Oilsum
2	Mercedes	Fontaine	4	3.829	6.50	299.39	A.C.	Mercedes	Bosch	Goodyear	33x4 1/2	112	Monogram
3	Detroit Spl.	Buzane	4	3.826	6.50	283.00	Grossman	Miller	Bosch	Goodyear	33x5	111	Monogram
4	Packard	DePalma	12	2.825	4.50	199.00	A.C. and K.L.G.	Zenith	Delco	Goodyear	33x5	112	Monogram
5	Stutz	Cooper	4	3.828	6.50	295.00	Rajah	Miller	Bosch	Goodyear	32x4 1/2	102	Aristo
6	Mercer	Thomas	4	3.872	6.375	300.70	Rajah	Miller	Bosch	Goodyear	32x4 1/2	103	Oilsum
7	Duesenberg	Milton	4	3.75	6.75	299.00	K.L.G. and Rajah	Miller	Bosch	Goodyear	32x4 1/2	106 1/2	Oilsum
8	Duesenberg	Henderson	4	3.75	6.75	299.00	A.C.-Rajah	Miller	Bosch	Goodyear	32x4 1/2	106 1/2	Oilsum
9	Hudson	Mulford	4	3.502	5.00	288.60	A.C.	Hudson	Delco	Goodyear	32x4 1/2	107 1/2	Oilsum
11	Duesenberg	Hearne	4	3.75	6.75	298.20	Rajah	Miller	Bosch	Goodyear	32x4 1/2	106 1/2	Oilsum
12	Hoskins	Lewis	4	3.75	6.75	298.00	Rajah	Miller	Bosch	Goodyear	32x4 1/2	105	Oilsum
14	Hudson	Vall	6	3.523	5.00	290.00	A.C.	Hudson	Delco	Goodyear	32x4 1/2	105 1/2	Oilsum
15	DeLage	DeVigne	4	3.78	6.00	290.00	A.C.	.....	.....	.....	32x4 1/2	106	Caster
16	Newman	Taylor	4	3.812	6.50	295.00	Rajah	Miller	Bosch	Goodyear	32x4 1/2	102	Oilsum
17	Hudson	Patterson	6	3.502	5.00	288.60	A.C.	Hudson	Delco	Goodyear	32x4 1/2	105 1/2	Oilsum
18	Mercer	Haines	4	3.872	6.375	300.70	Rajah	Miller	Bosch	Goodyear	32x4 1/2	103	Oilsum
22	Ogren	Henning	4	3.656	7.00	292.00	Rajah	Miller	Bosch	Goodyear	32x4 1/2	104	Oilsum
23	Pan-American	Alley	4	3.625	7.00	289.00	Bosch	Miller	Bosch	Goodyear	32x4 1/2	106	Caster
24	Frontenac	Boyer	4	3.87	6.37	298.00	K.L.G.	Miller	Bosch	Goodyear	32x4 1/2	104	Oilsum
25	DeLage	LeCaine	4	3.769	6.00	280.00	A.C.	Miller	Bosch	Goodyear	32x4 1/2	106	Caster
27	Oldfield	Oldfield	4	3.635	7.00	288.10	A.C.	Miller	Miller	Firestone	34x4 1/2	104	Oilsum
29	Omar	Toft	4	3.75	6.75	298.00	Rajah	Miller	Bosch	Goodyear	32x4 1/2	106	Oilsum
31	Ogren	Mason	4	3.656	7.00	292.00	Rajah	Miller	Bosch	Goodyear	32x4 1/2	106	Oilsum
32	Mercer	Al Schillo	4	3.872	6.375	300.70	Bosch & Rajah	Miller	Bosch	Goodyear	32x4 1/2	...	Oilsum
33	Duesenberg	Durant	4	3.78	6.00	280.00	A.C.	Miller	Miller & Bosch	Goodyear	32x5	...	Oilsum
35	DeLage	Andy Burt	4	3.638	7.125	295.00	K.L.G.	Miller	Bosch	Silvertown	32x4 1/2	106 1/2	Oilsum
42	Erbes	Diedrich	4	3.75	6.75	298.20	A.C.	Miller	Bosch	Goodyear	32x4 1/2	106 1/2	Oilsum

allowed a great deal of the oil to be wasted. Another difficulty he encountered was the oil leaking upon the clutch, which caused the latter to slip so much that his speed was greatly reduced.

As is usually the case, little refinements presented themselves on the cars and probably one of the most noteworthy was the double system of drag-links on Oldfield's Special. This consisted essentially of a worm type steering gear, the transverse shaft of which carried at one end a ball-arm and drag-link to the left steering knuckle and at the other a spur gear. The latter meshed with another gear of exactly the same size mounted upon a short shaft extending over the frame of the car, to which was fastened a second ball-arm.

This was connected up to the right steering spindle with a similar drag-link as on the other side. In fitting this system of steering it was stated that the car would have a greater factor of safety, inasmuch as in case one steering arm broke the other would still hold. Also, much strain is taken off the front spindles by having a push on one and a pull on the other, whereas there is a greater strain on the spindle arm when but one drag-link is used.

The Frontenac cars, which were the lightest cars entered, possessed many features not usually found on high-speed cars. There was a total absence of brake levers, one set being operated by a foot pedal as usual and any additional braking being supplied by the driver or mechanic reaching over the side of the car and grasping the taped portion of the cable which actuated the other set of brakes. The cable passed from one side of the car to

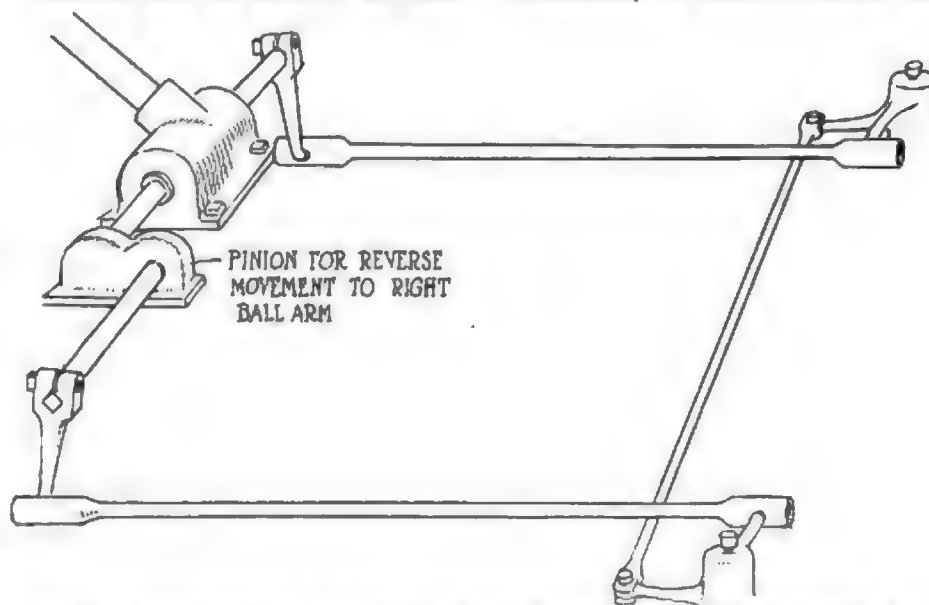


Clock on de Palma's steering wheel

the other so that either one could work it. Chevrolet had also fitted to the Fron-

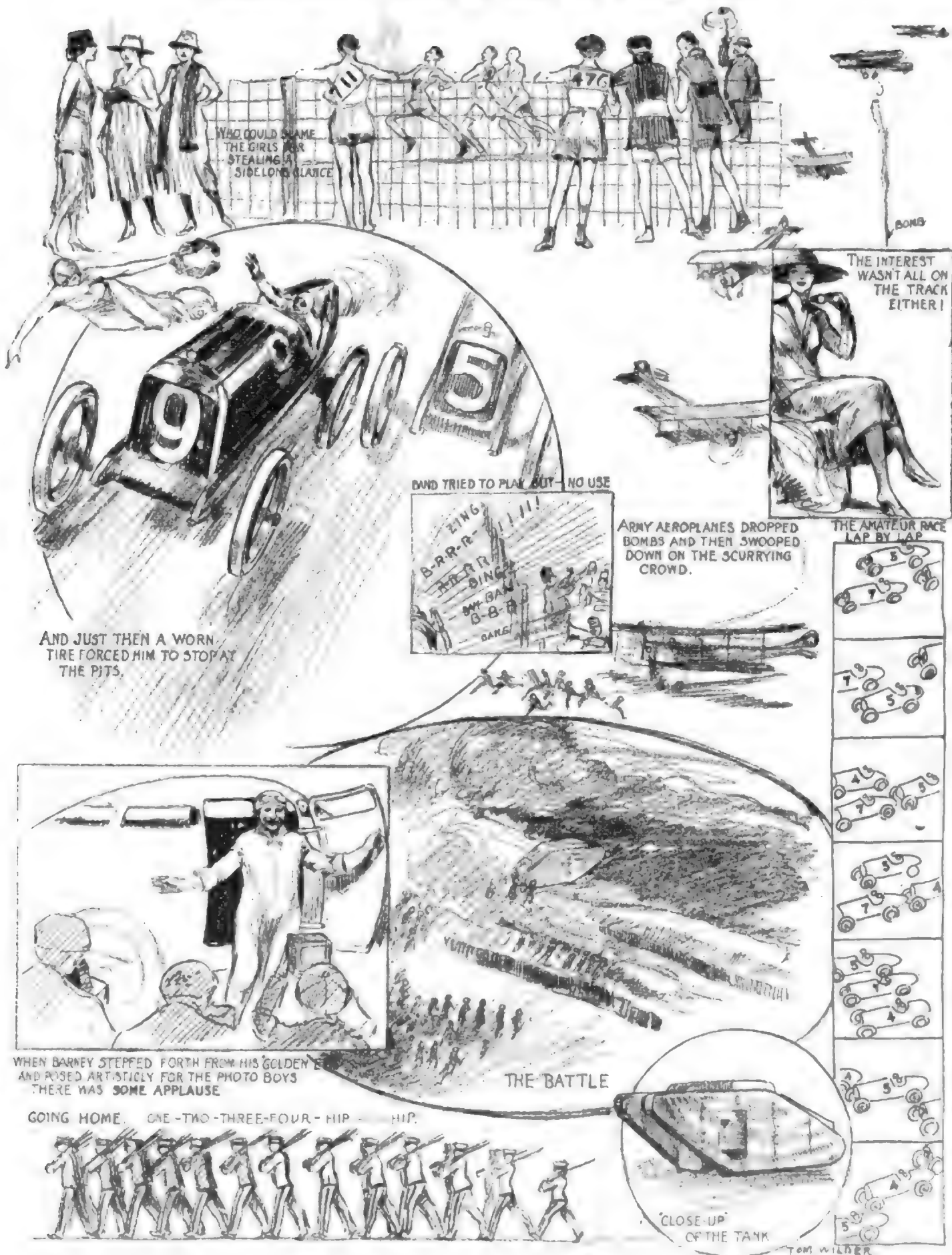
tenacs a flexible steering wheel which was designed to relieve the driver's wrist from all shocks. The spider of this wheel was made out of one piece of thin steel, which made it very flexible and at the same time strong enough for high-speed work. Provision also was made on the Frontenacs for cooling the oil, and this consisted of a series of fins fastened to the oil tank in such a position that a current of air struck them continuously while the car was in motion. It was this tank on Chevrolet's car that sprung the leak, and being directly over the cone clutch, caused the latter to slip by the oil getting into it.

Undoubtedly de Palma's Packard was



Novel system of steering on the Oldfield special, consisting of two drag links added for greater strength and safety

Chicago Motor Derby as Seen by Artist Wilder



Lelands Quit Cadillac

Founder of Company and Son
to Make War Planes for
Government

Have Studied Needs of U. S. in Air-
craft and Will Produce

DETROIT, June 18—Henry M. Leland, president and founder of the Cadillac Motor Car Co., and his son, W. C. Leland, vice-president and general manager of the company, have resigned. Both father and son will end their duties with the Cadillac company July 31, the end of the fiscal year, and will begin the manufacture of war airplanes for the United States.

Plans are going forward for the reorganization of the Cadillac executive staff. R. H. Collins, formerly sales manager of Buick Motor Car Co., Flint, Mich., and for the last year acting as assistant to W. C. Durant, president of the General Motors Corp., has been appointed general manager of Cadillac by Mr. Durant.

Mr. Leland is not yet ready to state where his new factory will be located, although he and his son have carefully mapped out the plan of procedure. They expect to manufacture on a huge scale. Early in the war Mr. Leland visited England to study aviation needs and conferred with Lord Montague, Lord Sydenham, Sir Albert Stanley, and others. He has recently been in constant conference with members of the Council of National Defense. Referring to airplane conditions he states that at the present time there is not an airplane made in America that is fit to fly over Germany during the war and that most of the machines that have been made were manufactured by enthusiasts for experimental purposes. He said he is going to help the United States put a fleet of aircraft in the air that will be built along scientific lines and will be safe to use over the hostile army. It is believed that the new factory will be located in or near Detroit. Mr. Leland and his son will retain their financial interests in the Cadillac Co.

Henry M. Leland founded the manufacturing concern of Leland & Faulconer in 1890. In 1902 he established the Cadillac Automobile Co., which became the Cadillac Motor Car Co. in 1904.

He was elected president of the Society of Automobile Engineers in 1913 and has for years been regarded as one of the biggest men in the industry.

AVIATION SCHOOL OPEN JULY 5

Mt. Clemens, Mich., June 18—The Joy Aviation Field which has been sold to the government as was reported in a recent issue of *MOTOR AGE* will be known officially as Selfridge Field, and will be ready for aviation work by July 5.

The field will be a replica of the others which are now being constructed throughout the country. It is a 600-acre field and contains 160 acres of timberland, which is being cleared and will be converted to construct corduroy roads over the surrounding grounds.

Work has been in progress for a short time and there are now in course of construction twelve hangars, two aero repair shops, six officers' quarters, six non-commissioned officers' quarters, school buildings, hospital power house, six barracks, four latrines, quartermaster's supply department, aerial supply depot, and machine shops. Some of these buildings are nearly ready for occupancy.

The field will be a complete city with grading, sewage systems, heating and lighting plants, school houses for the children of its occupants, and so forth.

When in full operation 900 students will be accommodated. The field is named in honor of the late Lieutenant Thomas N. Selfridge, the first United States navy or army officer killed while flying.

U. S. RUBBER ADDS STOCK

New York, June 18—The United States Rubber Co. has acquired the minority stock of the Rubber Goods Mfg. Co., thus solidifying its financial structure. This move will enable the company to take title to the physical property and all assets of the Rubber Goods company and will consolidate into the parent company the entire tire and mechanical goods portion of its business.

The United States Rubber Co., at the end of 1915, owned all but \$1,532,300 of the \$27,293,100 preferred and common stocks of the Rubber Goods company. By the end of 1916 this amount has been further reduced to \$991,900. Now all of the minority stock has been purchased and the Rubber Goods company will have its capitalization reduced to some purely nominal figure like \$100,000.

TO LIST AIRPLANE PLANTS

Chicago, June 19—The Council of National Defense has directed the Society of Industrial Engineers, organized here May 26, to gather complete data on the equipment of all plants in the United States that can aid in the manufacture of airplanes or parts of aircraft. The order came at the close of the national conference on industrial preparedness held under the auspices of the Western Efficiency Society and which closed yesterday. The society also will list all industrial engineers whose knowledge and training may be of service in the war.

The following officers were elected: Chairman of the board of directors, Charles Buxton Going, New York; treasurer, S. T. A. Loftis, Chicago; and assistant treasurer and secretary, G. C. Dent, Chicago. Mr. Going will have his headquarters in Washington, D. C.

U.S. to Push Road Work

Officers in War Department May
Urge Highway Construction
as Military Need

Priority Shipments of Materials to
Be Advocated

WASHINGTON, D. C., June 18—Special telegram—Efforts on the part of governors of different states, state highways commissioners, and others interested in the successful prosecution of good road work as a military necessity, promise to meet with a gratifying degree of success, judging by the interest being taken in the matter of priority of shipment of road building materials by officers high in the War Department, members of the Council of National Defense, Logan Waller Page, chief of the roads division of the Department of Agriculture, and others in position to give aid.

General J. B. Aleshire, former Commissary-General of the U. S. Army, has been placed in charge of priority shipments by rail by the Council of National Defense and the needs of the road builders of the country will be submitted to General Aleshire by a special committee named to visit Washington within a few days for the purpose of submitting resolutions adopted recently at a meeting of good-roads workers in which present day needs are strongly set forth.

Mr. Page said he stands ready to give all aid in his power on having road building materials given preference by the transportation heads and he also said he believed the Council of National Defense, through its proper committee, would give a request of this character that consideration to which the matter is entitled.

The committee named to visit Washington is as follows: R. A. Meeker, state highway engineer of New Jersey; Hon. Carl Milliken, governor of Maine; Col. W. D. Sobler, chairman Massachusetts Highway Commission; Nelson P. Lewis, chief engineer, Board of Estimate and Apportionment of New York City; Charles W. Gates, former governor of Vermont; James H. Macdonald, former state highway commissioner of Connecticut; John F. Richmond, chairman State Board of Public Roads of Rhode Island; George P. Coleman, state highway commissioner of Virginia; H. M. Sweetland, president Class Journal Co.; Arthur H. Blanchard, professor of highway engineering, Columbia University; E. L. Powers, editor *Good Roads*.

DEPARTMENT APPROVES PLAN

Detroit, June 18—The immediate development of the River Rouge to enable boats to reach the proposed new Ford blast furnaces has been recommended by Secretary Baker as a war necessity.

The Secretary of War mentioned the importance of the tractor as a means of increasing food production in connection with the river improvement, but pointed out specifically that the saving in transportation is a feature which makes this work imperative. He also stated that the Ford process of turning raw iron into fin-

ished cars and tractors, practically in one plant, will allow the use of vast transportation facilities for other purposes. The Secretary of War's recommendation was contained in a letter mailed to Chairman John H. Small of the committee on rivers and harbors and it is expected this letter soon will be presented to the house to support the amendment providing \$200,000 for the River Rouge work.

The government action in pronouncing the Ford River Rouge activities important may have an important bearing on the Ford-Dodge suit so far as the attempt of the Dodge brothers to discredit this reject is concerned.

WILLYS TO HEAD CURTISS?

Toledo, Ohio, June 19—Special telegram—John N. Willys has been asked to become president of the Curtiss Aeroplane Co., and plans are being made for the erection of the main Curtiss plant at Toledo adjoining the Willys-Overland Co.'s plant.

WALL GETS COMMISSION

Indianapolis, Ind., June 17—William Guy Wall, vice-president and chief engineer of the National Motor Car & Vehicle Corp., has been selected by the War Department to assume charge of designing and production of armored cars and tanks for the army. Following a trip to Washington last week, he accepted the offer of the government and was commissioned a major by Secretary of War Baker.

BRISCOE SHOWS 39.2 M.P.G.

Dallas, Tex., June 18—The regular stock model Briscoe with stock equipment recently made 39.2 m.p.g. on a measured gallon of Texaco gasoline on the streets of Dallas and adjoining country roads. In another test by the local Briscoe dealer of four cars, a drive was made to Mineral Wells and return, a distance of 172.2 miles. One car made the entire trip on 6 gal. of fuel, averaging 28.5 m.p.g., another 28.17 m.p.g., and the third 27.4.

TRUCK DEMONSTRATOR SOON

Detroit, June 15—Rumors that the Ford Motor Co. is shipping demonstrator trucks to dealers at this time are untrue. Experiments with the Ford trucks are not yet completed at the Ford factory but MOTOR AGE can state authoritatively that all experimental work will be completed within thirty days and that at that time demonstrator trucks will be shipped to dealers.

TO ANNOUNCE INCREASE SOON

Toledo, Ohio, June 15—The Willys-Overland Co. is informing its dealers that it shortly will announce a definite price increase. The increase is due to the increasing cost of materials and labor, which is being experienced by the entire motor industry.

Army Road Around U.S.

Senate Bill Would Provide Military Marginal Highway Along Borders of Country

Good Roads Representatives Made Preliminary Draft

WASHINGTON, D. C., June 15—What will be known as the Military Marginal Highway Bill has been introduced into the United States Senate by Chairman George E. Chamberlain of the Committee on Military Affairs.

The plan provides for a main national highway along or near the Atlantic seaboard, the southern boundary and the Pacific Coast, with extension highway ultimately along the Canadian boundary of the United States. Provision is made for other roads intersecting the highway, the radial highways to be constructed by the states independently or with Federal aid.

The committee on the timeliness of roads legislation with comprehensive military preparation was composed of John A. Wilson, chairman of the A.A.A. military preparedness committee; George P. Coleman, president of the American Association of State Highway Officials; Samuel Hill, president of the Pacific Highway Association and John Craft of the Alabama highway department. George C. Diehl, chairman of the A.A.A. good roads board; Henry G. Shirley, executive chairman of the American Association of State Highway Officials, and Osborne I. Yellott, chairman of the A.A.A. legislative board, were entrusted with the preliminary draft of the bill.

REO WINS PATENT SUIT

Lansing, Mich., June 18—The Reo Motor Car Co. was completely exonerated by patent decision handed down by Judge Hazel of New York, June 13, in the case of William Barber vs. the Reo Motor Car Co. This was the case in which the patentee sought to recover \$1,500,000 for alleged infringement of an ancient patent. In the preliminary skirmish, the Reo Motor Car Co. was given an adverse decision due largely to the fact that the company was certain that there was no similarity between the Barber patent and the Reo mechanism and failed to treat the matter seriously.

When the New York case finally came to trial, the Reo company introduced additional evidence with the result as above indicated—a decision to the effect that the Reo valve mechanism does not, either in design or in application, infringe the Barber patent.

ANNOUNCES SPORT ROADSTER

Cleveland, Ohio, June 18—The Jordan Motor Car Co. is now ready to make de-

liveries of its new Sixty sport roadster. This model is 200 lbs. lighter than its predecessor and is equipped with special Vanadium steel springs, the rear being 59 in. long. It is geared 4½ to 1 and on numerous road tests has done over 60 m.p.h.

Special attention has been given to body lines—the line from the Motometer to cowl is straight and back of that point to the deck the line recedes gradually. Seat cushions are 10 in. thick and rest directly on the floor.

PULLMAN SALE HELD UP

York, Pa., June 16—Exceptions having been filed, the proposed sale of the Pullman Motor Car Company's plant in this city by the creditors to the National Products Co., Trenton, N. J., has been held up at least temporarily. Creditors of the company, represented by Attorneys Harvey A. Gross and Fred B. Gerber, of this city, on Friday filed their exceptions in the United States district court at Scranton, and Judge Witmer, at the request of the receivers, William A. Keyworth, Carlton L. Hoff and Henry D. Schmidt, of this city, will fix an early date for a hearing.

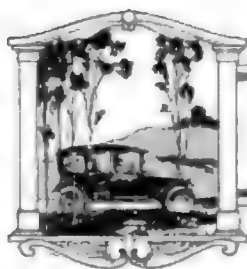
The National Products Company agreed to purchase the plant and assets except the accounts and bills receivable, for \$260,000. This sum the company says is not enough, and another bid has been made, one of \$315,000, by Samuel Winternitz & Co., Chicago and Detroit. Michael S. Niles, of this city, is the attorney for the receivers. Had not the exceptions been filed the sale to the National Products Co. would have gone into effect on Friday, June 15, according to the agreement entered into several weeks ago.

T. C. A. DIRECTORS

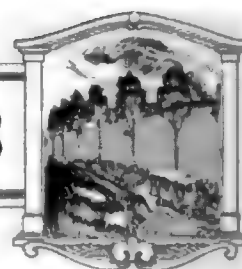
Chicago, June 18—The newly formed Touring Club of America perfected its organization at a meeting at the Chicago Automobile club last night by electing a board of directors composed of W. G. Tennant, Harry Newman, Thomas J. Hay, E. F. Meyer, John P. Dods, Burley B. Ayres, and B. F. Affleck. Arrangements are under way for making all local units of the national body affiliated organizations of the American Automobile association. The organizers are out for 10,000 members in the Chicago territory. When the local organization is completed a national membership campaign will be launched.

BLUE BOOK PUBLISHER DIES

New York, June 19—Max Holtz, president of the Associated Blue Books Pub. Co., publisher of the Automobile Blue Books, Motor Life and the Automobile Trade Directory, died in New York today from a nervous breakdown. He was widely known as financial expert in the dry goods field. He leaves a widow, a son, Howard, and a daughter.



EDITORIAL PERSPECTIVES



Making the Speedways Pay

THE management of the Chicago speedway is to be congratulated upon its wisdom in arranging the program which was sufficiently varied and of sufficiently timely interest to draw a crowd which for the first time in the history of the Chicago track paid expenses. The combination of military events in the staging of sham trench engagements, together with utilization of military airplanes and pseudo-tanks, combined with motor car races and variegated by athletic events, served to produce a variety of interests that drew the long-looked for crowd.

THE wisdom of the management in playing upon the patriotic interests of the public at this time by announcing a donation of a percentage of gate receipts to patriotic funds also had its effect. All in all, the day's program was one which deserved a crowd. The day when speed alone served to attract

a large attendance is past. For speedway races and speedways to be profitable they must offer a show. The Chicago speedway has done it successfully.

IN the detailed arrangements of the race plans there were some things which need improvement. One of these is better arrangements for handling photographers. A number of regular photographers, whose business it is to picture national events and upon whom the public relies to provide photographic information to supplement that of the press writers, were prevented from properly performing their functions at the motor derby through what was neither their own fault nor wholly that of the speedway. The difficulty seemed to come through the issuance of credentials and military track passes to amateur and free lance photographers whose only adequate equipment was their nerve.

Motor Car War Tax

MOTOR AGE is in receipt of a letter from a reader criticizing its attitude with reference to war taxes and asking why this publication did not come out strongly against the proposed federal tax on owners as a war emergency measure, just as it did on the two proposed measures of the war finance bill, which the reader felt more directly affected MOTOR AGE's pocketbook. By this he referred to the proposed tax of 5 per cent on all cars built, which was to be collected direct from the manufacturers, and the proposed increase in second-class postage rate.

PERHAPS there are other readers who did not get the real distinction between these issues. MOTOR AGE in raising its voice against the clause which put a 5 per cent tax on motor cars at the source and the increase in second-class postage rates was moved by as patriotic impulses as when it defended the new federal license tax on owners. The manufacturers' tax on motor cars, had it become a law, would have put many motor car concerns completely out of business, would have crippled others so that the list prices of the cars would have to be increased more than the 5 per cent of the tax, would have made motor cars scarcer, and therefore more expensive for the owner to buy and run. Of course, it is definitely understood that though the manufacturer paid the tax directly, he would be forced to increase the list price proportionately.

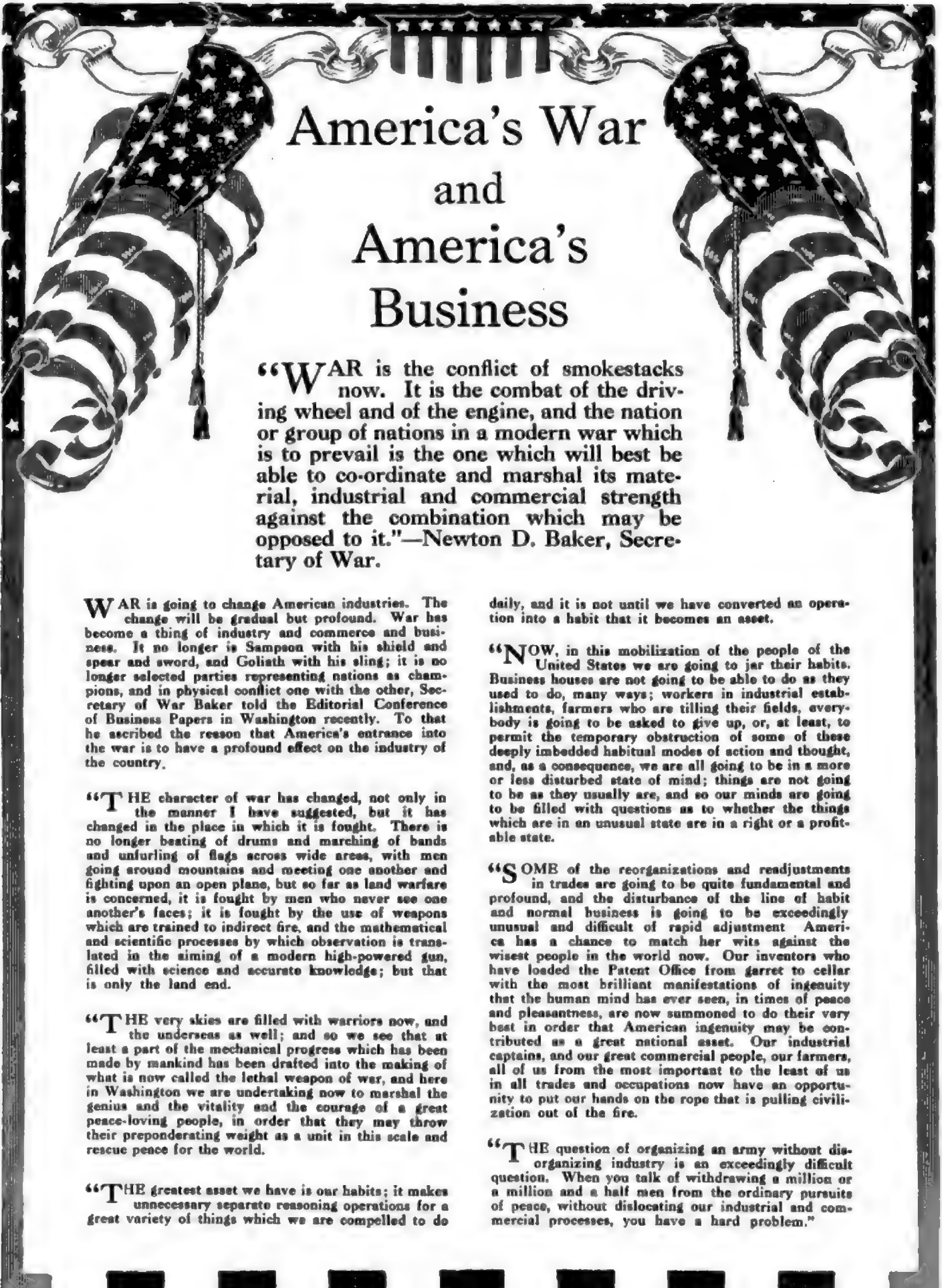
THE United States needs motor vehicles in very large quantities for its military expansion and for carrying out successfully the plans for prosecution of the war. To have cut down its possible sources of supply by putting a proportion of the industries out of business would have made it impossible for the government to obtain the thousands of motor cars and trucks for which it is asking. Similarly, the very radical increase in postage rates on second-class mail matter, which was proposed, would have made it impossible for a large proportion of the publications of the country to have continued in business, in the face of present increased cost of paper, inks, engravings and other things which go to make up a publication. To have caused the discontinuance of those publications which would have been unable to continue would have been a result directly

contrary to that desired by the measure as the income derived from those who survived under the new tax would have not been as great as the present income derived from a flourishing industry under the present more or less favorable conditions.

LIKEWISE, also, this tax, directed at the source, would have had to come directly from the pocketbooks of the ultimate purchaser, the subscriber of the magazine. The government is utilizing the entire press of the country in its enlistment, preparedness and financial propaganda and gives chief credit to the press for its successful floating of the Liberty Loan as a popular subscription. For the government to have weakened the press of the country in an ineffective effort to increase the income from that source would have weakened the very arm of the industry which is proving among those of greatest value to it.

IN spite of the fact that it is class legislation, a feature which will have to be overlooked as long as legislative bodies persist in considering the motor car a pleasure rather than a utility vehicle, the federal license tax on motor car owners is worthy of support. It seems to present a method of increasing the government's revenue which will not work a great hardship on any one industry or any one man. The amount of money which will be expended by any one individual owner is not sufficient to greatly increase his cost of operation. It is small as compared with the increased first cost of the cars due to the higher cost of material and labor. In other words, by the wide distribution of the tax over three million motorists, no one man's burden will be excessive.

THERE is another angle to the federal license tax on motors, which is the silver lining to the tax cloud. This is the very probable effect it will have on hastening the much desired substitution of federal licensing with federal number plates and with nation-wide reciprocity of licenses among all the states. If the annoyances due to the present system of state licensing are done away with through the influence of the present war measure, it will be worth all it costs to the motorists of America.



America's War and America's Business

“WAR is the conflict of smokestacks now. It is the combat of the driving wheel and of the engine, and the nation or group of nations in a modern war which is to prevail is the one which will best be able to co-ordinate and marshal its material, industrial and commercial strength against the combination which may be opposed to it.”—Newton D. Baker, Secretary of War.

WAR is going to change American industries. The change will be gradual but profound. War has become a thing of industry and commerce and business. It no longer is Sampson with his shield and spear and sword, and Goliath with his sling; it is no longer selected parties representing nations as champions, and in physical conflict one with the other. Secretary of War Baker told the Editorial Conference of Business Papers in Washington recently. To that he ascribed the reason that America's entrance into the war is to have a profound effect on the industry of the country.

“THE character of war has changed, not only in the manner I have suggested, but it has changed in the place in which it is fought. There is no longer beating of drums and marching of bands and unfurling of flags across wide areas, with men going around mountains and meeting one another and fighting upon an open plane, but so far as land warfare is concerned, it is fought by men who never see one another's faces; it is fought by the use of weapons which are trained to indirect fire, and the mathematical and scientific processes by which observation is translated in the aiming of a modern high-powered gun, filled with science and accurate knowledge; but that is only the land end.

“THE very skies are filled with warriors now, and the underseas as well; and so we see that at least a part of the mechanical progress which has been made by mankind has been drafted into the making of what is now called the lethal weapon of war, and here in Washington we are undertaking now to marshal the genius and the vitality and the courage of a great peace-loving people, in order that they may throw their preponderating weight as a unit in this scale and rescue peace for the world.

“THE greatest asset we have is our habits; it makes unnecessary separate reasoning operations for a great variety of things which we are compelled to do

daily, and it is not until we have converted an operation into a habit that it becomes an asset.

“NOW, in this mobilization of the people of the United States we are going to jar their habits. Business houses are not going to be able to do as they used to do, many ways; workers in industrial establishments, farmers who are tilling their fields, everybody is going to be asked to give up, or, at least, to permit the temporary obstruction of some of these deeply imbedded habitual modes of action and thought, and, as a consequence, we are all going to be in a more or less disturbed state of mind; things are not going to be as they usually are, and so our minds are going to be filled with questions as to whether the things which are in an unusual state are in a right or a profitable state.

“SOME of the reorganizations and readjustments in trades are going to be quite fundamental and profound, and the disturbance of the line of habit and normal business is going to be exceedingly unusual and difficult of rapid adjustment. America has a chance to match her wits against the wisest people in the world now. Our inventors who have loaded the Patent Office from garret to cellar with the most brilliant manifestations of ingenuity that the human mind has ever seen, in times of peace and pleasantness, are now summoned to do their very best in order that American ingenuity may be contributed as a great national asset. Our industrial captains, and our great commercial people, our farmers, all of us from the most important to the least of us in all trades and occupations now have an opportunity to put our hands on the rope that is pulling civilization out of the fire.

“THE question of organizing an army without disorganizing industry is an exceedingly difficult question. When you talk of withdrawing a million or a million and a half men from the ordinary pursuits of peace, without dislocating our industrial and commercial processes, you have a hard problem.”

Billion for War in Air?

Senate Committee Begins Hearings on Bill Authorizing Huge Sum

Coffin Warns People Real Effect to Come by Airplanes

WASHINGTON, D. C., June 15—The United States may spend \$1,000,000,000 to fight war in the air. Already the Senate Committee on Military Affairs has appointed a subcommittee to begin hearings on a bill of Senator Morris Shppard of Texas to establish a Department of Aeronautics. The decision of the committee to begin hearings on this measure is taken to mean that a strong administration sentiment in favor of this radical step exists. Senator Shppard's bill provides an appropriation of \$1,000,000,000 for carrying its provisions into effect. Should the bill become a law, a secretary of aeronautics would be appointed as a member of the Cabinet.

General George Owen Squier, who directs the Nation's aviation service, advocates an overwhelming aerial fleet and in speaking of the airplane program which, if passed by Congress, will involve some \$600,000,000 in the beginning, says:

"Airplanes are the logical fighting machines for Americans because we are an imaginative people, and when our imaginations strike fire nothing can stop us. We are impatient of plodding methods, a Nation of individualists. We are willing to send our hundreds of thousands to the front if needs be to dig holes and burrow in the soil for interminable months, but we don't enthuse over the idea. We want something that appeals to our knack of inventing things, for getting over obstacles in an original way. And the air way is our way.

Dependent on Aviation

"The modern type of land war is dependent upon two things above all others—aviation and artillery. They are co-operative elements in a fighting army, and against an enemy a flying machine is a terror and a menace to big guns. That airplanes are positively essential for directing artillery fire is an axiom among military men who have seen action in the sort of battles being fought on the western front."

In a statement by Howard Coffin, chairman of the aircraft production board of the Council of National Defense, the American people are warned that they must be prepared to enter the war in the air to an extent hitherto unthought of if their power is to have any real effect on the result of the war during the next year. The American authorities have been informed by the British and French that if the United States will supply them immediately with airplanes and aviators commensurate with

this country's manufacturing resources it unquestionably will contribute more to the success of the Allied cause and the defeat of Germany than the sacrifice of thousands of American lives on the western front later on.

Great Britain's last appropriation for aircraft alone was \$600,000,000. Her appropriation for the present year probably will approximate a billion. France has spent an equal amount on her air program. The United States, in the face of the existing situation, cannot afford to be niggardly, says Mr. Coffin.

REO TRUCKS REQUISITIONED

Lansing, Mich., June 16—The United States Government gave compulsory orders for $\frac{3}{4}$ -ton trucks to the Reo Motor Car Co., this week, for shipment to Tacoma, Wash., where one of the biggest of the Government's war enterprises is now in full swing. The reports from Tacoma show that the Government has acquired a vast acreage along Puget Sound. These quarters must be in shape by Sept. 1, when 40,000 men will be centered at this point. Other requisitions by the Government received by Reo this week were for trucks for Fort Snelling and Fort Sheridan.

NEW TRACTOR-TRUCK

Lapeer, Mich., June 18—The Lapeer Tractor-Truck Co. has placed on the market a tractor-truck, in two models, with Waukesha four-cylinder $3\frac{1}{2}$ by $5\frac{1}{4}$ in. engine selling for \$1,900 and \$2,000.

The 2- and 3-ton type is furnished as a complete tractor with a cab and trailer without the body for \$1,900 and the $3\frac{1}{2}$ - and 5-ton model, which includes the complete tractor with the cab and trailer without the body, is \$2,000.

The tractor-truck engine has a separate head, three point suspension, block-cast cylinders and three main bearings.

NEW SUPERHEATED MANIFOLD

Superior, Wis., June 18—J. G. Barnsdale, chief engineer and general manager of the Continental Motor Truck Co., Superior, Wis., which is completing work on its new plant, has perfected a new design of superheated manifold, combining intake and exhaust pipes, for motor vehicles, making the use of kerosene and the heavier distillates of petroleum possible without ordinary carburetor. The first design is one for Ford cars and in exhaustive tests it has been found that a car of this kind not only will travel 10 m.p.h. faster on kerosene than on ordinary gasoline, but 10 m.p.g. further. The plan of the device differs radically from those designed for gasoline. Instead of spraying the fuel into the cylinder, the Barnsdale device holds the kerosene in the manifold until the heat has vaporized it, and it then passes into the combustion chamber. The new manifold will be marketed by the Superior Manifold Co., controlled by Mr. Barnsdale, and will be made in the new truck plant. Patents have been applied for.

Aerial Schools Centered

France Builds World's Biggest Aviation Field and Concentrates Facilities

American Students Uncertain as to U. S. Corps Standing

PARIS, France, May 1—The greatest aviation training school perhaps in the world has now been started somewhere in France, many of the other big schools throughout the country having been brought to this point so as to have the schools for teaching flying with the different machines all together. The schools located at this point are Farman, Voisin, Caudron, Nieuport, Schmidt, Bleriot, Catterone and Breguit. Practically every airplane used on the front has its school at this point, where all classes of work are taught except acrobatics. The Nieuport machines are the only ones used in acrobatic work, and the school for this is located at another point in France.

It is a most interesting place where all these great airplane schools are located. Here the aviators are taught everything in connection with planing, including all kinds of repairs for planes and motors, night flying, bombing, photography, observation, etc. There are very extensive repair shops nearby, where complete construction in all kinds of motor and plane repair is given. It is necessary when reaching your school in the morning to go a great many miles by motor truck, after which there is a long walk.

Many Americans connected with these French aviation schools are wondering what will be their status now that the United States has entered the war. Some of these aviators have good rank in the French army, and they are wondering what their standing will be in the United States corps. Many of the Americans would prefer to remain with the seasoned French aviation officers.

OWNERS' PATRIOTISM ABUSED

Chicago, June 18—Many patriotic dealers and private car owners who have volunteered their cars for such service as they can give the military and Red Cross forces have found that service not what it seemed to be. They have found imposition in many cases, and this may explain the withdrawal of some of the many offers made in the first heat of the declaration of war.

Probably those behind the organizations asking the enlistment of cars of dealers and private owners in transporting soldiers, Red Cross supplies and so on, in the seemingly unending calls for motor aid in these days of preparation, do not sanction the abuse of the offers made. The offers are abused, however. A dealer sends his brightly polished, unscarred demonstrating car to headquarters for patriotic use. He

learns when he gets it back that it has been used for joy-riding in many cases, and the joy-riders have scratched the finish, marred the cushions and in other ways showed no appreciation of the courtesy.

Meetings of dealers have been called in various cities by citizen committee leaders to ask the use of cars. The dealers are willing to do their share in emergencies but are not willing to bind themselves to supply machines except when real necessity arises. As one dealer expresses it, he cannot see his way clear to placing a car and driver at the disposal of Captain Jinks to send his orderly after his laundry; for Colonel Kink to go to the tailors to be measured for a new uniform; etc., when he needed the car for demonstrating purposes.

One Boston woman placed her car at the disposal of the Red Cross, and she was ordered to report at 9 one morning. She did. She was sent to a suburb to take a family to a hospital. The patients decided not to go that day. On reporting this she was sent to another suburb to get another patient. She took a woman and child to a hospital and was told to go after them later on. She did so, only to learn that the woman was down town shopping but would be back later. She took the child home and then went home to send a letter to the committee to tell them she was too busy to continue that work. She felt that someone was being imposed upon and she did not propose to drive around those who could go shopping and use street cars.

BUICK SIX AT \$1,385

Flint, Mich., June 16—The Buick Motor Co. has brought out a new six-cylinder, seven-passenger car carrying a three-point suspension block engine of 3 3/4 by 4 1/2 in. bore and stroke in a 124-in. wheelbase chassis and selling for \$1,385. It has left drive and center control. The engine is said to develop 60 brake horsepower and has light pistons and connecting rods. The valves are large and mounted in readily accessible cages in accordance with the Buick overhead valve construction. Oiling is by circulating splash, and cooling, which is by pump, is thermostatically controlled. The electric system is a Delco single-unit type.

The clutch is a special multiple disk dry plate, and gearset is three-speed selective. The rear axle is a Weston-Mott floating design carrying the entire load on the housing, with the differential mounted on large Timken roller bearings. Drive is by inclosed shaft with a single self-oiling universal to spiral bevel gears. Service brakes are internal contracting. Timken roller bearings are used in the front wheels. Rims are demountable and tires are 34 by 4 1/4 straight side.

The rear springs are the special Buick floating cantilever type with semi-elliptics in front, aided by shock absorbers. The equipment includes one-man type top, rain-vision windshield, speedometer, clock, horn, lamps, etc.

Packard Contest Ends

St. Louis, Omaha, Youngstown and Phoenix Carry Off the Honors of Sales Race

Arizona Firm Sells 350 Per Cent of Its Quota

DETROIT, June 18—St. Louis, Omaha, Youngstown, Ohio, and Phoenix, Ariz., won the Lincoln Highway Sweepstakes, the national sales contest of the Packard Motor Car Co. The contest started Feb. 22, and the cities having Packard dealers or branches were divided into four sections. St. Louis won with 115 per cent of her quota sold. The St. Louis territory is controlled by the Packard-Missouri Motor Co., of which W. J. Parrish is president. Kansas City is included in the territory. Detroit was second in Division A, which is composed of the largest cities, with 103 per cent; Cleveland, third, with 102 per cent; Philadelphia, fourth, with 100 per cent.

The Orr Motor Sales Co. of Omaha sold 200 per cent of its quota. The next four in division B are: Washington, 147; Seattle, 144; Indianapolis, 127; Atlanta, 113.

In Division C H. S. Thorne of Youngstown sold 300 per cent of his quota. San Antonio was second with 175; Montreal, third, 150; Denver, fourth, 128; Louisville, fifth, 125.

McArthur Bros. of Phoenix made the highest mark in the entire contest with 350 per cent of their quota sold. They are in Division D and the other leaders are: Fort Wayne, second, 266; Texarkana, third, 233; Saginaw, Mich., fourth, 150; Altoona, Pa., and Elmira, N. Y., fifth, 133 each.

Individual Winners

Trophies for individual salesmanship did not go to the cities with the highest collective showings. The master salesmen, with their scores, are: Division A, F. J. Peterson, Cleveland, forty-eight; F. C. Sibbald, Cleveland, thirty; C. E. Holzkamp, New York, twenty-seven.

Division B—A. S. Blair, Baltimore, twenty-one; H. C. Berg, Seattle, nineteen; D. H. Luttrell, Washington, nineteen.

Division C—E. W. Travis, Youngstown, twenty-three; R. C. Lemm, Denver, twenty; W. R. Hicks, Montreal, eleven.

Division D—A. R. Dearborn, Phoenix, thirteen; M. D. Cabbage, Fort Wayne, eight; B. N. Anthony, Texarkana, seven.

PACKARD DEALERS SAIL

Detroit, June 18—More than 600 representatives of the Packard Motor Car Co. with their families, left Detroit to-day on board the Steamer Noronic for a three-day cruise. The Noronic will carry the dealers and their wives through several of the Great Lakes and return here Thursday morning. These dealers were the winners

of the Lincoln Highway Sales Sweepstakes conducted by the Packard company. Final conclusions of the sweepstakes will be announced on the cruise and the winners will be awarded hand-carved hall clocks.

Department managers of the company have placed thousands of dollars' worth of exhibits of new models of cars and trucks on the main deck. Appropriate decorations have been installed, and the large dance hall on the ship has been converted into a convention hall.

PERMALITE IN CONSOLIDATION

Indianapolis, Ind., June 15—The Permalite Corp. of Indianapolis and the W. L. Battery Co. of Poughkeepsie, N. Y., have consolidated and will be known as the Permalite Storage Battery Co., Inc. Offices will be maintained both in Poughkeepsie, where the batteries will be made, and in Indianapolis. The company is establishing depots over the country for the exchange of its batteries under a distribution plan which permits a Permalite user to exchange his battery as often as necessary for a perfect, fully charged one at a standardized fee, which amounts to about the same as a charge. The manufacture will be under the supervision of W. R. Wright, formerly with the W. L. Battery Co. and a pioneer in the business.

ROSS TO REORGANIZE

Detroit, June 15—Plans are being perfected for the reorganization of the Ross Automobile Co. John L. Ross is to take an extended vacation, and H. D. Mackaye is now general manager. The company will adopt a new policy, which is to do no manufacturing, discontinue models K 25 and A and assemble only model C, the Ross eight. New officials of the company will be announced soon.

Beginning Monday, June 18, the Ross Automobile Co. will have ready for sale to best bidder approximately \$75,000 worth of Model A and Paige 25 parts and several complete cars.

TO SELL GIBNEY PLANT

Philadelphia, Pa., June 16—An offer has been made by the Flak Tire & Rubber Co., for the purchase of the Gibney Tire & Rubber Co., of Conshohocken, Pa., now in the hands of a receiver. It is reported that at least two other concerns of national importance have made offers. There is reason to believe, however, that the company itself will make an offer and that it will be higher than the rest. The bids will be submitted to the U. S. District Court in this city about June 25, and final adjudication will be made July 10.

CHALMERS TESTS ACCELERATION

New York, June 16—Official figures are released by the A.A.A. contest board on a Chalmers acceleration test. June 9 W. F. Sturm, contest manager for the Chalmers factory, conducted the trials on the Con-

course. Joe Dawson did the driving. The car used was a five-passenger stock taken from the floor of the local branch the morning of the trials. That there might be no discrepancy in the relative speeds at the different points, from four to eight trials were made for each distance attempted. The Chalmers went from a standing start to 33.3 m. p. h. in 10.2 sec.

The regular stock equipment was carried on the car. The top was down. U. S. Royal Cord 32 by 4 tires were used.

465 MILES ON HIGH GEAR

Boston, Mass., June 16—A swing around New England of 465 miles, all on high gear without stopping the motor, and doing it between dawn and dusk, was the endurance run made by the first Dodge Bros. car ever delivered in New England. It was made to show the flexibility of the four-cylinder engine. The start was made at 3 a. m. with four persons in the car, C. S. Henshaw, Dodge Bros. dealer; J. H. Keene, the driver; W. L. Shepard, a salesman, and James T. Sullivan, of the Bay State A.A. as observer. The low and intermediate gears were chiseled off the shaft.

From Boston the car went down through Newburyport to Portsmouth, N. H., then over to Kittery, Me. Retracing the trip the run continued back through Massachusetts and into Brattleboro, Vt. There the chief of police refused to allow the motor to be kept running, so it was stopped a few minutes while the party had coffee and sandwiches.

Then the run was back through Massachusetts and down to Putnam, Conn., and across to Woonsocket, R. I., making that the turning point for Boston. The last mile was reeled off at 8:30 in the evening. No attempt was made to create a speed record. The car averaged 19.5 m. p. g. Not a stop was made for mechanical trouble, and one tire puncture was recorded. The car had traveled 35,000 miles before making the test, and a year ago it made the run on high gear through Crawford Notch to Bretton Woods and back in a day.

OLDS RAISES PRICES

New York, June 18—The Olds Motor Works, Lansing, Mich., will raise its prices \$100 on all models July 1. On that date the eight-cylinder model will be listed at \$1,395 for the five-passenger, \$1,467 for the seven, \$1,395 for the club roadster. The five-passenger six-cylinder model and the two-passenger roadster will be listed at \$1,195.

JORDAN BUSINESS INCREASES

Cleveland, Ohio, June 15—The shipments of the Jordan Motor Car Co., during May amounted to 287 cars, making the total of Jordan factory sales to date \$2,703,750. The orders on hand June 10 for immediate shipment were 236. Of the 2000 cars planned to be built before Sept. 1 at a maximum rate of ten a day 1545 have been shipped.

To Standardize Aircraft Makers' Association Hears Report That 2500 Planes Can Be Made at Once

Patents Committee to Select Ideas and Safety Patents

NEW YORK, June 16—The Aircraft Manufacturers' Association decided to undertake the work of establishing its own standards for the aircraft industry in cooperation with the Society of Automotive Engineers at a meeting held here this week. The entire technical staffs of the manufacturers in the association have been placed at the disposal of the standardization committee and the S. A. E. will be invited to have representation on the committee, which will proceed with its work at once.

The materials committee reported that supplies on hand at the factories are sufficient to produce 2500 airplanes immediately, these comprising 4,000,000 ft. of air-dried spruce and 3000 yd. of Irish linen for wing and fuselage covering. The committee also reported that the efforts of the association have overcome difficulties hitherto experienced in the transportation of materials and the delivery of finished products from the allied trades. The association has established an industrial directory covering the fields supplying raw materials and finished products to the aircraft industry.

Advanced ideas in the aeronautics and several safety devices are under consideration by the patents committee which will select those best suited to immediate requirements and place them under development.

A letter was received by the advisory committee from Howard E. Coffin, chairman of the Aircraft Protection Board, stating that there is no intention to concentrate the aircraft industry in Detroit and urging the closest possible relations between the board and Aircraft Manufacturers' Association. The advisory committee has been in consultation with authorities at Washington and the members have made frank statements of their ability to produce airplanes in quantity. The manufacturers are only awaiting the action of the Government in ordering some of the 3500 airplanes it is planned to build before next spring to go ahead on quantity production.

The aircraft industry can produce with its present equipment based on piece time operation five types of machines. While the manufacturers prefer to make their own types of machines in the greatest possible quantities and at the same time to carry along the development of the training type plane based on those in use by the allies in Europe, they expressed their

willingness to set aside for the present their equipment suitable for regular production and concentrate on the training machines which are needed immediately and then to follow later with their own types if desired.

The Society of British Aircraft Constructors is desirous of working in close cooperation with the Aircraft Manufacturers' Association as set forth in the communication read at the meeting. The British society is composed of practically every British constructor of aircraft or aviation engines and by affiliation with the American Association renders available first-hand information based on actual observation developed from experience in the field and viewed from a manufacturers' standpoint. Although the aircraft industry in England was far inferior to the present state of the industry in America at the beginning of the war, the output of finished planes is now about 800 a week. The manufacturers engaged in this work have a capitalization of \$375,000,000. The industry in America has a capitalization of about \$20,000,000 and based on a time equipment can turn out in three months one-fifth as many planes as England with her experience of 3 years under war time conditions.

The Hall-Scott company was elected a manufacturing member of the association with H. T. Whitaker as representative.

One feature brought out very clearly at the meeting is that the aircraft industry in this country has passed beyond the experimental stage and is on the threshold of a great development.

WHITE EMPLOYEES SUBSCRIBE \$200,000

Cleveland, Ohio, June 18—Over 3,500 out of 4,800 employees of the White Motor Co. have subscribed an aggregate of \$200,000 to the Liberty Loan. The company itself has subscribed \$500,000 to the loan.

JOHNSON INCREASES WAGES

Racine, Wis., June 19—For the second time this year S. C. Johnson & Son have announced a voluntary increase in wages throughout the entire organization. The payroll includes 250 men and women.

FORD PRODUCTION FOR MAY

Detroit, June 15—The Ford Motor Co.'s production for May is 83,616 cars, which is an average of 3,216 a day, or better than two cars a minute. May 19 was the biggest day in the month, turning out 3496 cars. Ford also is making 2500 ambulances for the United States government.

AJAX MAY EARNINGS \$319,588

New York, June 15—Net earnings of the Ajax Rubber Co. for May were \$319,588, or at the rate of \$3,935,044. For the 5 months ended May 31 net earnings were \$1,102,684, or at the annual rate of \$2,245,368. The returns for May were the largest in the history of the company for a similar period. For the 5 months the

company earned \$7.76 a share on its stock, or at the annual rate of \$18.60 per share.

At a meeting of the board of directors last Tuesday it was decided to appropriate \$450,000 for improvements, additions, etc., in order that the capacity of the plant may be increased. The company is now over 100,000 behind its deliveries of tires and tubes. Less than 3 per cent of the tires manufactured by the Ajax company go to the manufacturers, the rest being sold direct to the public.

The company has also decided in favor of buying \$100,000 worth of Liberty Loan bonds. This is in addition to \$30,000 or \$40,000 subscribed for by employees of the Ajax company.

COLUMBUS PLANS RACE TRACK

Columbus, Ohio, June 15—With preliminary plans completed, the Columbus Motor Speedway & Horse Racing Co., new entry in the racing field, is ready to renew its financing campaign. The company has an authorized capital stock of \$200,000, all common, and proposes an addition of \$300,000.

The proposed project is a combination speedway, two race courses and a steeplechase course. The location selected is west of the city. From the viewpoint of accessibility and facilities to handle large crowds, the location is regarded as ideal. The 200-acre tract is 3 miles from the center of the city, is reached by two street car lines, several paved streets, several well-graded pikes from the surrounding country, a steam railroad and two interurban lines.

The latest type of construction for places of this kind is planned. One grandstand, overlooking all the courses, will be erected, with subways leading to the field, thus eliminating danger during meetings.

OMAHA HAS 15 ENTRIES

Chicago, June 18—Signing up of fifteen entries by Phil McShane of the Omaha speedway at the Chicago race last Saturday assures Omaha of the race on July 4. The opinion had been voiced that the Chicago race would be the last big race this year, but Omaha is going ahead and expects to add materially to the number of entries obtained so far.

There will be two events, one for 150 miles with seven prizes, totaling \$8,000, and one of 50 miles with four prizes, totaling \$2,000. Entries close at midnight June 29. The entry list at present includes:

Car	Driver
Hudson	Mulford
Hudson	Vall
Hudson	Unnamed
Mercer	Thomas
Mercer	Haines
Mercer	Unnamed
Duesenberg	Milton
Duesenberg	Henderson
Duesenberg	Hearne
Frontenac	Chevrolet
Omar	Toft
Olson Spec.	McBride
Detroit Spec.	Buzane
Pan-American	Alley
Ogren	Henning
Hoskins Spec.	Lewis

Airplanes for Business

Wider Radius of Practical Use as for Motor Cars Is Foreseen

Standardization of Parts is Criticized as Premature

INDIANAPOLIS, IND., June 18—Dr. Tobias Dantzig, instructor of mathematics at Indiana University, and a graduate of the Aeronautical Institute of Paris, discussed the subject "The Future of the Aeroplane and the Principles of Aeroplane Construction" before the Indiana section of the Society of Automotive Engineers at the Claypool Hotel last night. The meeting, which was the last of the year, was attended by the largest crowd in the history of the Indiana section. Officers for next year were elected as follows:

Chairman, F. A. Cornell, assistant general sales manager of the Cole Motor Car Co.; vice-chairman, Charles S. Crawford, chief engineer of the Premier Motor Corp.; secretary, Frank E. Smith of the Universal Motor Products Co.; treasurer, C. E. Jeffers, designing engineer, Nordyke & Marmon Co., and the fifth member of the board of directors, P. E. Moskovics, commercial manager of the Nordyke & Marmon Co.

Doctor Dantzig in his talk on airplane construction displayed two airplane models—one a Curtiss biplane military tractor and the other a monoplane patterned after the German type. He spent considerable time in French airplane factories, and he told of the general principles adopted there for the construction of military machines.

After explaining the mechanical features of the two models, Dr. Dantzig attacked the proposal of American engineers to standardize airplane parts, and this attack was the subject of much subsequent discussion.

CLEVELAND SECTION

CLEVELAND, OHIO, June 15—The main paper at the closing meeting of the Cleveland Section of the Society of Automotive Engineers was read by E. H. Sherbondy of the Peerless Motor Car Co. on "Aviation Motors with Particular Reference to the Benz and Mercedes Type," which will be reproduced next week.

The meeting was preceded by a dinner at the Statler Hotel. Moving pictures of White trucks in action on the Mexican border and in road building operations at Pike's Peak were shown.

The following officers were elected for next year: Chairman, W. R. Strickland, of the Peerless Motor Car Co.; vice-chairman, A. M. Dean, Ferro Machine & Foundry Co.; secretary, A. G. Welfare, National Carbon Co.; treasurer, H. C. Snow, Winton Motor Car Co.

"I am opposed to the proposed standardization of aeroplanes," he said. "The aeroplane may be said to be just beginning to enter a stage of productive evolution, and to seek to standardize the parts now would mean that future development would be retarded greatly.

"What would have happened to the automobile industry if parts had been standardized in the beginning? The development would not have been nearly so rapid. It would be a mistake to standardize aeroplane parts at this time, when no perfect mechanism for construction has been developed scarcely except the adopted mechanism of control. Standardization at this time would retard the development of the aeroplane.

"Aeroplanes are to have a wider radius of practical use than for mere sport and pleasure, just as the motor car has been developed into a commercial vehicle. Aeroplanes will be used for carrying passengers and mail and for exploring parts of the world of which we know little.

"It is not my belief that aeroplanes ever will be used for the transportation of freight. This would not be practical from an engineering standpoint. It is true that twenty machines carrying one passenger each will expend less fuel than one machine which is made to carry twenty passengers, thus showing that it would not prove practical to fly with freight.

"The automobile industry is the one industry to develop the aeroplane. Motor car factories may easily be converted into aeroplane factories and, as far distant as such a policy may seem now, it is very probable that many automobile plants will be converted into aeroplane factories in a few months if the demands of the army and navy are to be met. Automobile engineers should begin now to study flying problems—you may need the knowledge much sooner than you expect."

Doctor Dantzig urged the Indiana automotive engineers to attempt to have a branch of the Aero Club of America established at the Indianapolis Motor Speedway, which he declared fitted admirably for that purpose.

Following the address, Charles C. Crawford, chief engineer of the Premier Motor Corp., entered into a discussion of Doctor Dantzig's remarks opposing the standardization of aeroplane parts.

"I don't think Dr. Dantzig understands this proposal to standardize aeroplane parts," Mr. Crawford said. "Such an action is necessary now to meet war-time requirements and even in peace times, the standardization of parts would not retard development. Automobile parts are standardized, that is, we have accepted principles on which to work for a time, but despite this we are all constantly working for something better and when we make an improvement it is adopted as a part of the standardization. The development of the automobile has not been retarded as a result of standardization."







Routes and Touring Information



Hitchcock, S. D.—Mason City, Iowa

HITCHCOCK, S. D.—Editor *MOTOR AGE*—Give route from here to Mason City, Iowa.—E. L. Kruse.

From Hitchcock, drive to Huron, Iroquois, Manchester, Desmet, Lake Preston, Arlington, Volga, Brookings, Lake Benton, Tyler, Balaton, Tracy, Walnut Grove, Revere, Lambert, Springfield, Sleepy Eye, New Ulm, Courtland, Kerne, Mankato, Janesville, Waseca, Owatonna, Geneva, Glenville, Albert Lea, Northwood, Kensett, to Mason City.

Chicago-Denver, Col.—Los Angeles, Cal.

Chicago—Editor *MOTOR AGE*—Outline route from here to California, passing through Denver—Lew M. Goldberg.

From Chicago go to Lombard, West Chicago, Geneva, De Kalb, Creston, Rochelle, Ashton, Dixon, Sterling, Morrison, Unionville, Fulton, Lyons, Ia., Clinton, Dewitt, Grandmound, Wheatland, Lowden, Mechanicsville, Mt. Vernon, Cedar Rapids, Belle Plaine, Chelsea, Tama, Montour, LeGrand, Marshalltown, Lamotte, Nevada, Ames, Boone, Ogden, Grand Junction, Jefferson, Glidden, Westside, Vail, Denison, Marion, Dunlap, Woodbine, Logan, Missouri Valley, Council Bluffs, Omaha, Neb., Waterloo, Fremont, Ames, North Bend, Schuyler, Richland, Columbus, Clarks, Central City, Chapman, Grand Island, Alda, Wood River, Shelton, Gibbon, Kearney, Overton, Lexington, Cosad, Willow Island, Gothenberg, North Platte, Sutherland, Paxton, Ogallala, Brule, Bigspring, Chappell, Lodgepole, Kimball, Bushnell, Pine Bluff, Wyo., Egbert, Cheyenne, Dover, Nunn, Pierce, Ault, Lucerna, Greeley, Evans, Brighton, Denver, Colo.

From Denver continue to Littleton, Sedalia, Castle Rock, Colorado Springs, Fountain, Pueblo, Crow, Greenhorn, Walsenburg, Aguilar, Trinidad, Raton, N. M., Maxwell, French, Springer, Colombar Nolan, Watrous, Las Vegas, Tecolote, Pajarito, Pecos, Canoncito, Santa Fe, Domingo, Alameda, Albuquerque, Kirkpatrick Spring, Becker, Socorro, Magdalena, Datil, Quemado, Springerville, Cooley's Ranch, Rice, Globe, Fish Creek, Mesa, Tempe, Phoenix, Liberty, Buckeye, Arlington, Agua Caliente, Palomas, Dome, Blaisdell Sta., Yuma, Holtville, El Centro, Dixieland, Campo, Jamul, Lemongrove, San Diego, La Jolla, Torres Pines, Cardiff, Oceanside, Irvine, Tustin, Santa Ana, Anaheim, Fullerton, Montebello, Los Angeles.

Vols. 5, 7 and 8 of the Automobile Blue Book, published by the Automobile Blue Book Publishing Co., 910 South Michigan avenue, Chicago, contain complete running directions for this trip.

Denver, Col.—White Mountains, N. H.

Denver, Col.—Editor *MOTOR AGE*—Outline route from here to the White Mountain district of New Hampshire via Kansas City, St. Louis, Nashville and Washington, returning via Chicago.—H. A. Lindsley.

From Denver go to Bennett, Limon, Bovine, Flagler, Selbert, Stratton, Burlington, Kanorado, Kan., Ruleton, Goodland, Brewster, Colby, Oakley, Grainfield, Quinter, Wakeney, Ellis, Yocemento, Hays, Victoria, Walker, Russell, Bunker Hill, Wilson, Ellsworth, Salina, Abilene, Detroit, Junction City, Fort Riley, Ogden, Manhattan, Wamego, St. Mary's, Rossville, Silver Lake, Topeka, Lawrence, Eudora, DeSoto, Bonner Springs, Kansas City, Independence, Levasy, Wellington, Lexington, Waverly, Grand Pass, Marshall, Arrow Rock, Booneville, ferry across Missouri river, New Franklin, Rochepport, Columbia, Fulton, Warrenton, Wright

City, Wentzville, Dardenne, St. Charles, Junction, St. Louis, East St. Louis, Ill., Edgemont, Belleville, Freeburg, New Athens, Lenzburg, Old Town, Marissa, Tilden, Coulterville, Pinckneyville, Vergennes, Murphysboro, Carbondale, Makanda, Cobden, Anna, Mill Creek, Tamma, Sandusky, Unity, Cairo, Ohio River ferry, Sickliffe, Ky., Barlow, La Center, Heath, Mazon, Paducah, Briensburg, Eggner's ferry, Golden Pond, ferry, Cadiz, Hopkinsville, Clarksville, Adams, Springfield, Nashville, LaVergne, Murfreesboro, Beechgrove, Noah, Manchester, Hillsboro, Pelham, Wonder Cave, Monteagle, Tracy City, Sequatchie, Jasper, Rankins ferry, Wauhatchie, Chattanooga, Red Bank, Daisy, Sale Creek, Coulterville, Graysville, Dayton, Sheffield, Spring City, Lorraine, Roddy, Glenalco, Rockwood, Kingston, Lenoir City, Concord, Knoxville, Straw Plain, New Market, Jefferson City, Morristown, Warrensburg, Greeneville, Tusculum, Limestone, Telford, Jonesboro, Johnson City, Milligan, Elizabethton, Childras, Bluff City, Bristol, Abingdon, Chilhowie, Marion, Atkins, Wytheville, Newbern, Ingalls ferry, Radford, Christiansburg, Shawsville, Elliston, Salem, Roanoke, Blue Ridge, Thaxton, Bedford City, Lynchburg, Concord, Spout Spring, Appomattox, Evergreen, Pamplin, Prospect, Farmville, Burkeville, Nottoway, Blackstone, Wellville, Hebron, Sutherland, Petersburg, Richmond, Ashland, Coatesville, Mantio, Chilesburg, Partlow, Snell, Spotsylvania, Fredericksburg, Falmouth, Mountain View, Garrisonville, Dumfries, Occoquan, Lorton, Accotink, Alexandria, Washington, D. C., Beltsville, Laurel, Baltimore, Kingville, Belair, Churchville, Aberdeen, Havre de Grace, Principio Furnace, Charlestown, Elkton, Md., Newark, Del., Wilmington, Marcus Hook, Pa., Chester, Norwood, Darby, Philadelphia, Bustleton, La Trappe, Langhorne, Trenton, N. J., Lawrenceville, Princeton, Franklin Park, New Brunswick, Metuchen, Rahway, Elizabeth, Newark, Jersey City, Weehawken to New York.

From New York continue to Scarsdale, White Plains, Bedford, Cross River, South Salem, Ridgefield, Conn., Danbury, Newtown, Sandy Hook, Southbury, Woodbury, Middlebury, Waterbury, Marion, Plantsville, Southington, Plainville, Farmington, W. Hartford, Hartford, East Hartford, South Windsor, Warehouse Point, Enfield, Thomsonville, Longmeadow, Mass., Springfield, Holyoke, Northampton, S. Deerfield, Greenfield, Bernardston, Guilford, Vt., Brattleboro, Putney, Westminster, Bellows Falls, South Charlestown, N. H., Charlestown, Claremont, Ascuteyville, Windsor, Hartland, White River Junction, Hartford, W. Lebanon, N. H., Hanover, Lyme, Orford, Piermont, Haverhill, Woodsville, Bath, Lisbon, Littleton, Bethlehem, Maplewood, Twin Mountain House, Bretton Woods.

Vols. 7, 8 and 2 of the Automobile Blue Book contain complete running directions for the above trip.

Champaign, Ill.—Alma, Mich.

Champaign, Ill.—Outline route from here to Alma, Mich., via Huntington, Ind.—G. W. Robinett.

From Champaign, travel through Homer, Danville, Covington, Stonebluff, Rob Roy, Lafayette, Brookston, Monticello, Idaville, Logansport, New Waverly, Peru, Wabash, Fort Wayne, Maysville, Hicksville, O., Farmer, Bryan, Pulaski, Alvordton, Waldron, Mich., Hudson, Somerset, Jackson, Mason, Holt, Lansing, DeWitt, St. Johns, Ithaca, to Alma.

Vol. 4 of the Automobile Blue Book published by the Automobile Blue Book Pub. Co., 910 South Michigan avenue, Chicago, contains complete running directions for this trip.

Mitchell, S. D.—Trenton, Mo.

Mitchell, S. D.—Editor *MOTOR AGE*—Give a route from here to Trenton, Mo., preferably by way of Omaha, Neb.—W. Bauer.

From Mitchell, go to Alexandria, Emery, Canastota, Sioux Falls, Worthing, Beresford, Elk Point, North Riverside, Ia., Sioux City, Salix, Sloan, Whiting, Onawa, River Sioux, Missouri Valley, Omaha, Neb., Council Bluffs, Ia., Glenwood, Randolph, Shanandoah, Tarkio, Mo., Wilcox, Maryville, Savannah, St. Joseph, Osborn, Cameron, Hamilton, Nettleton, Chillicothe, north to Trenton.

Vincennes, Ind.—Coffeyville, Kan.

Wann, Okla.—Editor *MOTOR AGE*—State a good route from Vincennes, Ind., to Coffeyville, Kan.—H. A. Sheldon.

From Vincennes, proceed to Lawrenceville, Ill., Olney, Noble, Clay City, Flora, Salem, Odin, Sandoval, Beckemeyer, Ariston, Lebanon, O'Fallon, Edgemont, East St. Louis, St. Louis, Mo., Dwyer, Loehr, Grover, Hollo, Washington, Berger, Hermann, Morrison, Chamola, Osage City, Jefferson City, Centertown, California, Clarksburg, Tipton, Otterville, Sedalia, Montserrat, Warrensburg, Centerville, Holden, Strassburg, Pleasant Hill, Kansas City, Harrisonville, Archie, Adrian, Butler, Rich Hill, Arthur, Horton, Nevada, Moundville, Liberal, Nashville, Joplin, Crestline, Kan., Columbus, Oswego, Altamont, Independence, Wayside, Havana, Caney, Tyro, Dearing, to Coffeyville.

Vols. 5 and 7 of the Automobile Blue Book, published by the Automobile Blue Book Pub. Co., 910 South Michigan avenue, Chicago, contains running directions on this trip.

Maryville, Mo.—Los Angeles, Cal.

Maryville, Mo.—Editor *MOTOR AGE*—Which is the best route from here to Los Angeles?—Phil Smiley.

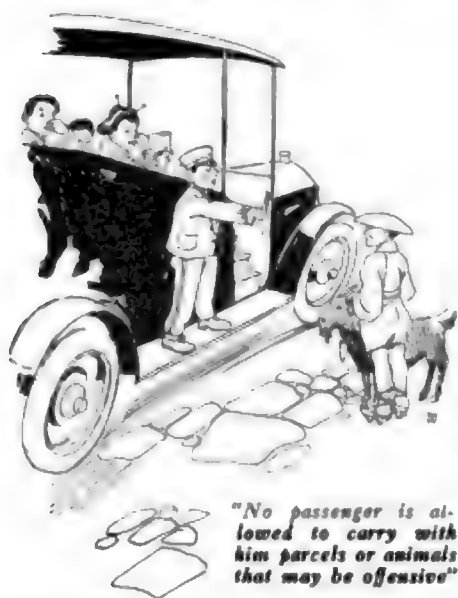
From Maryville go to Savannah, St. Joseph, De Kalb, Weston, Platte City, Parkville, North Kansas City, Kansas City, Harrisonville, Archie, Adrian, Butler, Rich Hill, Arthur, Horton, Nevada, Moundville, Bronaugh, Liberal, Nashville, Galesburg, Joplin, Crestline, Kan., Columbus, Oswego, Altamont, Independence, Sedan, Wauneta, Cedarvale, Winfield, Wichita, Cheney, Kingman, Cunningham, Pratt, Cullison, Mullinville, Dodge City, Cimmaron, Garden City, Deerfield, Lakin, Kendall, Syracuse, Holly, Colo., Granada, Lamar, Hasty, Las Animas, La Junta, Timpas, Thatcher, Tyrone, Hoehne, Trinidad, Raton, N. M., Maxwell, French, Springer, Colombar Nolan, Wagon Mound, Watrous, Las Vegas, Tecolote, Pajarito, Pecos, Canoncito, Santa Fe, Domingo, Alameda, Albuquerque, Kirkpatrick Spring, Becker, Socorro, Magdalena, Datil, Quemado, Springerville, Cooley's Ranch, Rice, Globe, Fish Creek, Mesa, Tempe, Phoenix, Liberty, Buckeye, Arlington, Agua Caliente, Palomas, Dome, Blaisdell Sta., Yuma, Holtville, El Centro, Dixieland, Campo, Jamul, Lemongrove, San Diego, La Jolla, Torres Pines, Cardiff, Oceanside, Irvine, Tustin, Santa Ana, Anaheim, Fullerton, Montebello to Los Angeles.

Vols. 7 and 8 of the Automobile Blue Book, published by the Automobile Blue Book Publishing Co., 910 South Michigan avenue, Chicago, contain complete running directions for this trip.

Motor Car Traffic Jinrikisha-ized

Nippon Car Operators Drive Under Rules That Bring a Smile

By William K. Gibbs



TRAFFIC regulation is a serious problem and deserves serious consideration, but the rules in force in one city of the world are so different, so primitive, when compared with what we are obliged to accustom ourselves to every day, that the serious side may be tabled for the moment and if, perchance, you should find a smile generated by the excerpts that follow, the purpose of giving them currency will have been fulfilled.

The Motor Club Speaks

Before giving the excerpts from this newly-discovered traffic regulation let us see what the motor club of the city where they are in force has to say of motor traffic. "The automobile is looked upon by many as a dangerous machine, but for what reason? If it is a good machine and is driven by a competent chauffeur, what is there dangerous about it? On the other hand, in defense of the automobile, you will find pedestrians everywhere except on the pavement. They do not heed the horn and you may even find them reading books in the street. . . . The people are not accustomed to the automobile and unless the driver is especially careful in handling the car and not to direct bad language on them as they pass on, the feeling toward the motor car and its occupants will remain unfavorable. . . . Some people dislike the haughty motorist, who comes along thoughtlessly and chases them to and fro with the terrible noises and his disagreeable exhaust."

"We have already warned them," says a police bulletin, with reference to careless drivers of cars, "to drive slowly in crowded streets, not to splash mud on the people who are walking along and to be polite and attentive to anyone."

Now for some verbatim clauses in the traffic ordinance itself:

"The speed of a motor vehicle shall in

no case exceed 10 m.p.h. in the urban district and 12 m.p.h. in the suburban districts and that of pedestrians in cases where the road is crowded.

"Every automobile shall be equipped with two brakes, one working on a drum fixed on the wheel or axle, the other working on the other parts of the machinery.

"Each vehicle shall be equipped with a maximum speedometer and if it is run by steam pressuremeter and water gage shall be fixed in an easily visible place.

"The machine shall be one that produces no great noise or vibration.

"No motor vehicle shall produce a large volume of odor, poisonous gas, steam or smoke."

With the reference to public cars the ordinance says:

"Passengers and the public shall be treated with courtesy and politeness and no insulting or overbearing words shall be spoken.

"Special protection and care shall be extended to the young and old and weaker sex when they go in or out of the car.

"Care shall be taken to make sure if there is nothing left by the leaving passenger.

"No stuff that is likely to smear or give out bad smell shall be taken in the passenger car.

"The maximum speed shall in no case be overdeveloped.

"When two or more motor cars run one after another the car behind the other shall be a distance of at least 60 yds.

"When passing by the military, the car shall be steered to the right whilst at all other times to the left."

The following persons are not permitted to take a ride:

"One who is drunk.

"One who is suffering from one of the eight contagious diseases or from a detestable disease.

"One whose dress is so dirty that it may give an unpleasant feeling to fellow passengers.

"No passenger is allowed to carry with him parcels or ani-

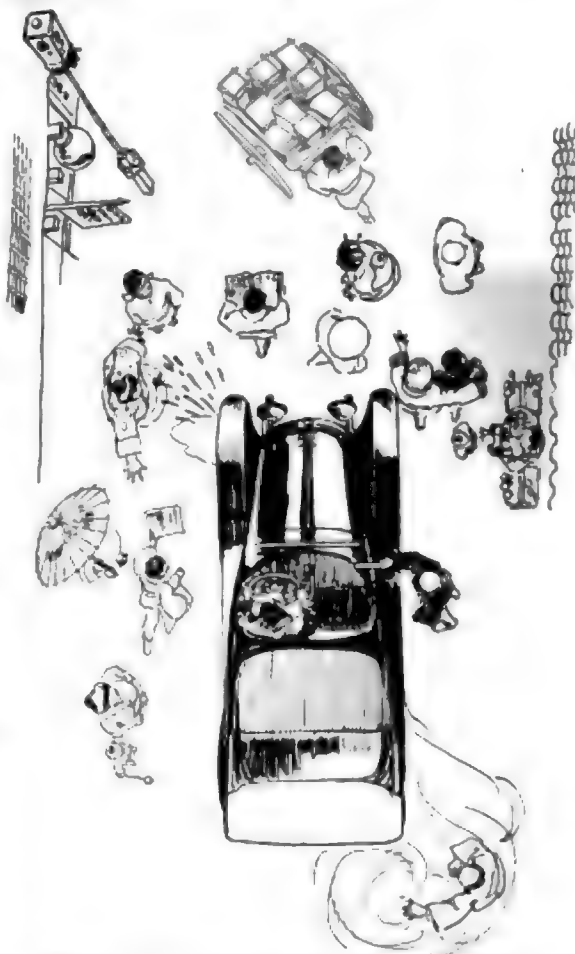
mals that may be offensive on account of odor or otherwise to passengers.

"No passenger is allowed to sing aloud, make a noise or act in such a way as to disturb other passengers.

"In order to enable the course of the vehicle to be dextrously changed differential steering gear shall be provided.

"Drivers are not allowed to smoke while driving a car."

You wonder where such regulations are in force? Hiat! Tokyo, Japan. Of course, Japan finds the motor car a newer product than we do in America. Besides her streets were not laid out to accommodate such vehicles. A jinrikisha path is not a motor road and besides, the millions who are subjects of Nippon are naturally cramped for room so that the roads are very likely to be over-run by pedestrians.



"You find pedestrians everywhere except on the pavement. . . . You may even find them reading books in the streets"





The Motor Car Repair Shop



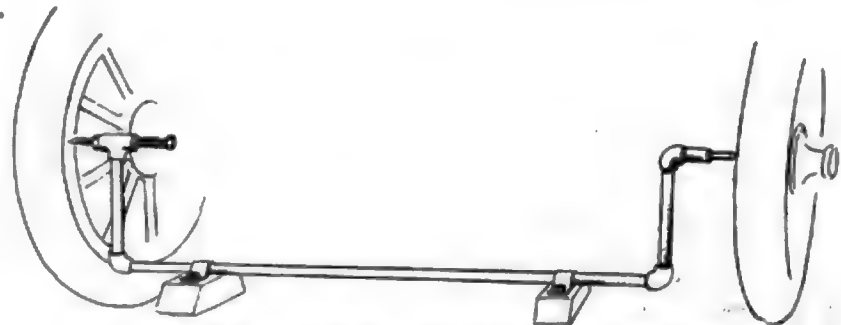
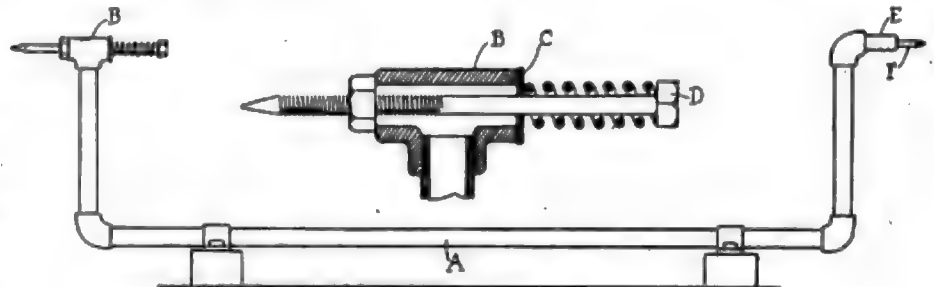
Testing the Wheels of a Car

IN order that the front wheels of a motor car will steer properly they must have a certain amount of what is commonly called gather. The proper amount of gather is obtained by adjusting the cross link that connects the steering arms of the front spindles. Ordinarily the amount of gather is from $\frac{1}{4}$ to $\frac{3}{8}$ in. This means that the extreme forward points of the wheel fellos should be from $\frac{1}{4}$ to $\frac{3}{8}$ in. closer together than the hindmost points of the fellos.

To Test Amount of Gather

A handy device for determining the amount of gather can be made out of a few lengths of gas pipe, together with a few elbows and tees, as shown in the illustration. The pipe A can be cut to the proper length when all the rest of the parts have been made, as this will assure of the apparatus having the right width to fit between the wheels. On one of the upright pieces of pipe an adjusting device is made consisting of a pipe tee B into which is fitted a bushing C. The latter is fitted with a bolt D, held in place at one end by a coil spring and a nut at the other. By turning the nut in or out the distance between the measuring points of the apparatus can be varied. Only one end is made adjustable, the other being simply provided with a short length of pipe E into which has been fitted a small piece of rod F. The pipe A is mounted upon two wood blocks and held to them by pieces of strap iron. Pipe A should not be held absolutely rigid to the blocks, to enable wheels of different diameters being accommodated.

In use the apparatus is placed in front of the axle, the wheels having been set in a straight forward direction. The nut on the



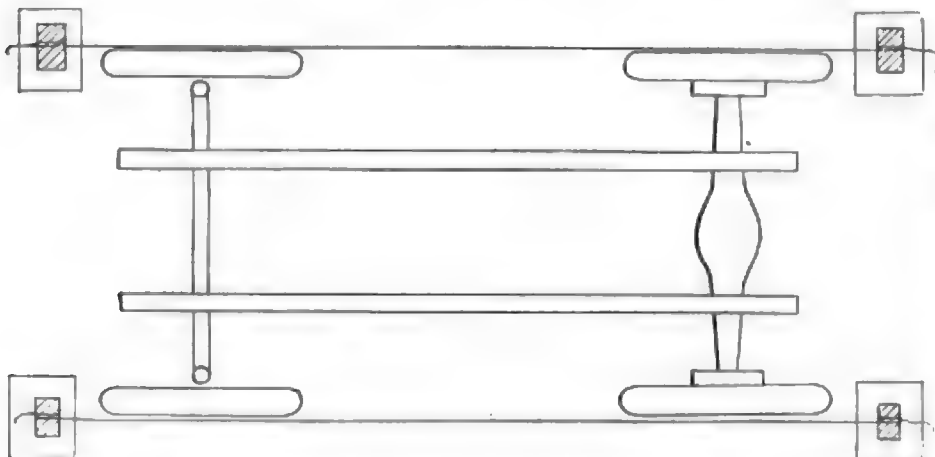
Method for determining amount of gather the front wheels contain

adjustable head is now regulated so that the measuring points just touch the fellos at the extreme forward points. Care must be taken to see that the apparatus is parallel with the front axle. This can be done by means of a yard stick or rule. Now with the adjustments secured in this position, the measuring device is moved to the rear of the car and placed between the rear wheels so that the measuring points come on the fellos as before. If the wheels are properly lined up, with one of the points touching the fellos on one wheel, the other end will lack from $\frac{1}{4}$ to $\frac{3}{8}$ in. of touching the other fellos.

To test the trueness of a wheel, jack up the axle so that the wheel clears the floor, spin it, and while it is revolving hold a pencil point or something similar close to the fellos of the wheel, resting the hand on the knee or a block of wood to hold it steady. Then regularity or irregularity of the distance between the fellos and the pencil point as the wheel revolves then will show whether or not the wheel is true.

To True Rear Wheels

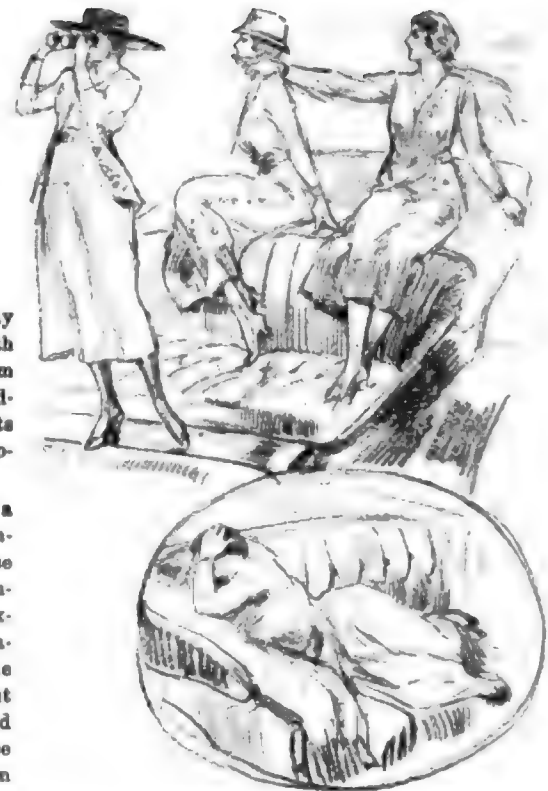
To line up the rear wheels to see whether or not they are parallel, two strings are stretched across four chairs or the like in the manner shown. The string is stretched so that it almost touches the tires, say about $\frac{1}{8}$ in. from them and it should be on a level with the floor at the height of the axles or immediately above or below them. The two strings should be parallel and also parallel with the side members of the frame of the car. When the strings have been stretched, take a ruler and measure the distance between the fellos of the wheels on both sides of the hubs. Rear wheel misalignment may be due to a bent axle shaft or the axle not being at perfect right angles with the frame of the car. A sagging spring or worn spring links will also throw the rear wheels out of line. If misalignment is found in the front wheels, the springs may have shifted, the steering arms may be bent, the transverse steering rod may be out of adjustment or the wheels themselves may be out of true.



To line up rear wheels and determine existence of misalignment

Looking at the Race

From the Woman's Viewpoint



Parked cars served as seats means between events

CHICAGO, SPEEDWAY, June 16—From the woman's viewpoint to-day's speedway events are symbolic of all the world's tragedy yet pregnant with the exhilaration of speed. For her war shadows the sun which lends perfection to the gathering. Yet for her also is that tense leaping of mind and thought which brings the upright bodies and the cheers of a crowd when the racers sweep by in that seemingly unceasing contest for victory.

High school boys—too young for draft, too old for apron strings—struggle in mimic battle on the field inclosed by the speedway oval. The latest type of airplane the country can produce, from the army aviation school, she remembers, darts and hovers above or poises lightly where all can see, on the ground, before resuming its quick flight. The knowledge that this may, and probably will be, the last big race of the year—and war—is, from her viewpoint at least, the knowledge that makes the day the quintessence of foreboding as to what these same high school boys may be doing before the cycle of time has turned further than to make them eligible for real warfare.

More Than 40,000

The crowd to-day is estimated all the way from 40,000 to 60,000. Nobody probably can compute it exactly; certainly not now, for the attendance is a shifting one. Look over the paddock and the rows of high school boys, some 3,500 strong, extend from one end of the 2-mile inclosure to the other. Other thousands throng the aviation section of the field, the parking spaces, the judges and press stands, the free-for-all standing room to which admission-only tickets admit.

Women are here in great numbers. They mingle with the line of spectators who stand by the side of the attacked trenches of the mimic warfare as no spectators ever stand by the side of the attacked trenches of real warfare. They, the chosen few who are granted that privilege, look with awe and interest and perhaps a little more of that foreboding on the wide-winged creatures of man that the steady-nerved, strong-hearted aviators guide up and away from time to time.

The grandstands are mere resting places. The crowd shifts restlessly to-day. This is more than a patriotic celebration which is to add to the interest, and sustain the former interest, attendant on a 250-mile grind. The men and women wearing the tags which entitle them to grandstand and

box seats more likely than not may be found standing side by side with the fortunate office boy to whom some godlike person has given an admission-only and that one who wants not, nay scorns, the seat of the plutocrat.

As a rule the speedway race is a man's race and women are mere onlookers. But surely to-day the case is far different. The speedway management can be given credit for exceeding even their wildest anticipations. They have brought to the public a patriotic celebration, but they have done more than that, and if for no other reason than because the woman does play the part of an onlooker physically more often than a man in a war the realization the day brings of what the United States may know within the next few months should, as it seems to do, make this a day of days for the women of this section as well as the men.

In the play creeping of the high school soldiers as they move from point to point in the rather long approach to the trenches, play trenches, there is a realism that is kin to tragedy. The woman-instinct, if you would call it that, sees ahead and sees all the bad, if not the good, of war and what must be sacrificed for it.

The airplanes are real. The bombs are real. The smoke curtain is horrible. A nightmare. In short, if it were not for the races to-day and the general gala appearance of the fellow crowd, this might be a tragedy in truth for many women instead of a day of days of sport.

It is a terrifically interesting race. The race itself is a culmination of the day's events. Not until the great cars came out to the pits, the nonprofessional event finished, did the grandstands become filled. Many have escaped the horrors of war, however mimic, by taking in only the 250-mile. The day was too long. They who did this were in the minority, however. The trains that ran out to the speedway from Chicago during the early part of the morning were filled. The aisles were crowded as on a rainy day and in the surface or elevated cars. The straphanger hung on. The standing-room-only sign would have done no service. There was no standing room left on these morning trains.

The transportation facilities that bring the crowds out to this speedway are excellent. Even to-day it would have been hard

to find fault with them. And to-day they were taxed as never before, as this was a record day from the standpoint of local speedway attendance as well as from others.

The red-hot vender had a terrible time keeping up with the voracious clientele. Think what it must have meant to have some 3,500 soldier-boys, even if they were of the high school age, and hence less deadly according to tradition, storm the citadels of your mere kindling-wood stand. But storm they did and when the spectators from the grandstands strolled tentatively out between the 100-mile nonprofessional and the derby to obtain a little surcease of the hunger the occasional grandstand hawker could not satisfy they strolled about a while, willy-nilly, until military wants were supplied.

Jackies Attended

The Jackie from the Great Lakes Naval Training Station roamed abroad in paddock and in stands, their uniforms an open sesame to all gates. The military aspect of the day and the military trend of the thoughts of those present became evident early in the quick recognition of any uniform.

"They certainly treated us good to-day," one of the sailors told another, and his companions agreed.

Oldfield's arrival on the speedway soon after 2:30 was greeted with universal acclamation from the crowds. The queer roofed-over racing car and the veteran in combination had aroused an already active interest. Added to this interest was the speculation as to whether Barney really

would start in his queer contraption, the taxicab, beetle, eggshell and nobody knows what it wasn't called. Popular belief had Barney out of the race early this morning. A sheared-off ring gear on the differential in the last practice lap of yesterday had made it seem impossible for the car to start. A will made a way. No doubt the dean of racers was determined to start in answer to the speculation. Anyway all-night work put the car in condition, and when the grind started No. 27, Oldfield's number, was in the first four. The taxicab had turned the try-out laps at a speed second only to de Palma's time of 110 m.p.h.

Oldfield and de Palma

Oldfield had the crowd on tiptoe for fear he would beat the favorite, de Palma, when he led the field until tire trouble brought him to the pits. He finally went out at the end of the twenty-fourth lap with a broken valve spring cup, "tire trouble," according to the grandstand announcement. This was the crowd's first big disappointment.

With Oldfield out de Palma held the spectators, but again were they doomed to disappointment as in the last Chicago race, the Grand American of last October, for de Palma's jinx is still on the job and a too-long pit stop lost what may be taken as the race crowd's one best wish, de Palma as a winner.

Never before has the attitude of a race crowd at a speedway been more like that of a Roman amphitheater than this to-day. The reason lies in the entrants and their known ability. That the race was so terrific, both in interest and speed, is due to such names as Oldfield, de Palma, Mulford, Cooper, Chevrolet and others that well might be included, all of which were on the speedway, and in the public's eyes possible winners.

When a leading racer stopped at the pits, the crowd cheered and exhorted the second man. A possible exception to this was de Palma. He had gone down before unexpected bad luck so often and has come up grinning so often that the public feels it a personal affront, judging from the comment in the grandstand, if from nothing else, and keenly resents any halt in the Italian's continued sweep around the oval.

Crowd Very Excitable

The crowd as a whole sprang to its feet more often than at the usual race. Women grew more excited over the standing during the early laps. Girls who had never attended speedway races seemed more insistent to know what it was all about. As the leaders of the field swung around into the home stretch of a lap as likely as not the first voice of encouragement would be feminine. Then men, women and children would rise in one accord to stand until the race had swept around the oval half-way back again.

Cries of "Down in front," so common to the American crowd, whether at opera, baseball game or pageant, were less appar-

ent than ever before in the writer's attendance at public gatherings. Woe to the man or maid who first cried such words. Treason, even. For when speed and skill held sway royalty was present, and this most democratic country must give recognition by standing to the only royalty known here, good sportmanship.

The names of the racers and the cars they drive have become so familiar to the public that they are personal. The woman who drives a car feels a specially quick interest in that car which bears the same name in the race, even if it is far different in structure and stamina from her own. The more uncommon names, too, have become familiar. Why, that man is driving de Palma's old Mercedes, this woman who drives will exclaim with pride in her own knowledge, and pride fitting a motor fan. That car is the one Oldfield drove at Cincinnati, she is sure.

Cooper's car, the Stutz, the winning car, has long been familiar both to masculine and feminine race observers, and though the car had no elaborate backing but was Cooper's own that did not detract from the interest, as Cooper, too, is well known to the crowd.

The three Hudsons attracted many women's attention, because so many women drive cars of the same name. Other reasons hold the attention, such as the personnel of the drivers, the publicity already given to special cars and such old-time names, from the standpoint of races, as Mereer, Duesenberg and Delage.

That like seeks like is evident at a speedway race as it can be evident no

where else. One looks at the cars parked in the paddock, at the cars lining up for the starting flag, the rows and rows back of the grandstands, apparently in an unravelable conglomeration. Yet you know that outside the speedway grounds there is a vastly greater assemblage of cars. Speedway day is a wealthy day for many thrifty folk who have possession of rental of fields into which cars may be crowded.

Lunches in Parked Cars

Until the big race starts there is a steady passage of men and women from the cars parked back of the grandstands to the paddocks and scene of the athletic events the high schools are holding. Lunches are brought out of tonneaus and runningboard cupboards. Here and there a regular tourist outfit, including a table for the tonneau, gives ease of lunching to those so lucky as to be prepared. The parked cars give that place of retreat and restfulness unknown to other than the car owners in many particulars. In the paddock those so fortunate as to obtain parking spaces where they could remain in their cars and still see all were indeed fortunate.

The trucks which brought the high school cadets out to the speedway were commandeered by chance spectators and made the best of advantage points. Even the tank used in the mimic attack on the trenches did not escape from mere everyday usefulness. At one time during the 250-mile race all the trucks, and there were at least a dozen in easy sight, were serving as observation stands for dozens of persons. The hooded drivers' seats served new purposes. They were higher.

Color Here Too

Color was everywhere on this day of sport days. The stands were decorated with flags, pennants were suspended from cords across the passageway for cars between the clubhouse and garages. Pretty girls and small boy scouts sold the flags of the nations among the spectators. The green and yellow of the women's clothes added to the color of red, white and blue and yellow of flags.

A bright green car was driven by a woman in yellow down the paddock to the parking stands near the pits. Loud? Not at all. Everyone wears a bit of color these days, and at a race of patriotic meaning, it is specially apt. A racer here and there bore the colors on his radiator cap. Most of them no doubt will be serving in the war in some position sooner or later. One of those who might have been here already is serving as aid to an American general. Perhaps the general public does not know but for those who do, and the women are among these, the absence of Rickenbacker, added to the general war tone of this as war cause day, meant much.

A gala day but from the conversation of occasional groups of women a more than that, one that foretells America's part in the great war for humanity.



They were awfully proud of their high school soldiers



The Readers' Clearing House



SOME RELEVANT FACTS ABOUT OIL

Tests the Motorist Can Make to Determine the Quality of His Oil

WASHBURN, Tex.—Editor MOTOR AGE—Would like information on the testing of oils, that is, the oiling qualities of oils of paraffin and asphalt bases, also the kind and percentages of carbon usually contained in each; lubricating qualities, etc.—T. N. Jameson.

In studying lubricating oils as regards their physical and chemical properties, it must be remembered that all lubricating oils are hydro-carbons, which means that they consist of a physical mixture of different chemical compounds of the elements carbon and hydrogen. Thus the term "non-carbon" oil used sometimes in the trade is obviously a misnomer, inasmuch as it is contrary to chemical laws. The engine oils made in this country are refined from crude oil having either an asphaltic or paraffin base. The crude oil having a paraffin base is considered the best oil from which to refine motor car engine oils, due to the fact that the latter contain no "sulpho" salts, which are entirely foreign to any oil as a lubricant. These "sulpho" salts, or compounds associated with oils refined from an asphaltic base, are caused by the manner in which the oil is prepared. All hydro-carbon oils are prepared for the market by one of two methods. These are called the sulphuric acid method and the filtration process.

Sulphuric Acid Process

In the sulphuric acid process several thousand gallons of oil are placed in a tank and kept constantly in motion by large paddles. The acid is added during the process of agitation and the oil becomes bleached out to a clear color. The whole is then washed with water, neutralized with an alkali salt and the oil bath washed free from the acid and salt. Theoretically the latter is accomplished, but in practice there remains a number of salts or "sulpho" compounds which have a tendency to break down the oil under high degrees of heat in the combustion chambers of the engine. Such acid-treated oils, if their use is long continued, will, in time, attack the metal surfaces of the engine. The effect of hot sulphuric acid gas upon highly-heated exhaust valves and seats is quite noticeable and causes rapid pitting. Oils refined by this process are brilliant to the eye and can be presented to the trade as decarbonized oils without apparent dispute. However, the inner materials referred to as dirt still remain in the oil.

The filtration process consists of letting the oil seep through Fuller's earth, which removes impurities and hydro-carbons of high carbon content. First class oils filtered in this way contain no "sulpho" salts and can be depended upon to stand up under nearly every possible engine con-

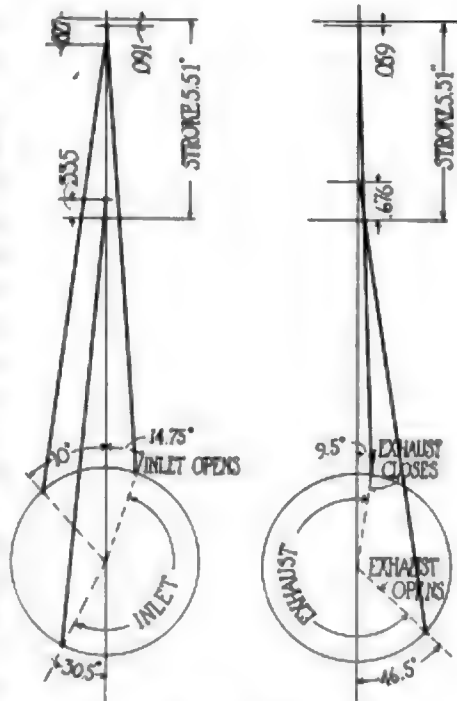


Fig. 1—Valve and ignition timing on 1913 Talbot racer

dition, so far as the temperature of the interior of the cylinders is concerned.

All engine oils contain a certain amount of carbon called "fixed" carbon, but this should not be confused with the term carbon deposit. Ordinarily in commercial oils the percentage of fixed or carbon residue increases nearly in proportion to the increase in viscosity, being lowest in light oils. The carbon residue that an oil contains does not necessarily indicate the relative amount of carbon deposit which will occur in the combustion chambers of the engine.

Carbon deposit in the cylinders is also

caused or influenced by the quality of the oil used, its viscosity, flash and piston-leakage. A choked muffler, incomplete combustion, due to an excess of gasoline mixture or faulty ignition, and dust drawn into the air intake of the carburetor are also more or less responsible for carbon deposits in the cylinders. Also there is a probability that a great deal of this carbon deposit is caused from the gasoline, inasmuch as the latter contains thousands of little particles of sulphur and other substances, which, when burned, will leave a deposit of so-called free carbon. Yet the motorist has been wont to blame his oil for all carbon deposits, and there is about twenty times as much gasoline used as lubricating oil in an engine. The asphaltic base oils are comprised of the series of hydro-carbons containing more carbon to the molecule than those of a paraffin base.

The average motorist is not in a position to make tests of oil which will give to him very definite information about the oil he is using and must take the word of the garage man or dealer who sells him the oil as to the quality of the latter. This, of course, does not apply to dealers who are known to handle oil of repute. But should a motorist suspect that he is getting oil of inferior quality, or suspect sulphonic acid compounds, there are a few simple tests he can make of the oil which will set him right on this point. For instance the heat test will show whether or not sulphonic acid compounds are present in the oil and is carried out as follows:

A small bottle is filled about half full of the oil to be tested and heated slowly over an open flame or electric plate as shown in Fig. 2 until yellow vapors begin to appear above the surface of the oil. The oil is held at this temperature for about 15 min. The heated sample is now compared with an



Fig. 2—Apparatus for testing quality of oil, which permits the average owner to make a few simple tests

unheated sample of the same oil and the quality determined. A good grade of oil will darken in color but remain perfectly clear and with no evidence of sediment, even after it has stood for a day. This will prove the absence of acid compounds. If the oil is impure it will turn jet black when heated and upon standing for any length of time will deposit a black sediment, called "sludge."

Another test for sulpho compounds is known as the emulsion test, and consists of filling a bottle (a 4 oz. will do) about one-third full of the oil to be tested and pouring in an equal amount of water, thus leaving a space of one-third the capacity of the bottle free above the oil and water. The bottle is then corked and shaken very vigorously for half an hour. It is then left to stand for 24 hrs. If the oil is of good quality a fine white line will appear between the oil and clear water below, indicating the absence of acid compounds. On the other hand, impure oil mixes permanently with the water, and appears as a curdled mass, floating upon milky-like water.

Simple Acid Test

A simple way to test oil for acid is to introduce into it a piece of blue litmus paper, which, if there is acid present, will turn to a pink color. Acid can also be detected by saturating a piece of flannel with the oil and placing it upon a bright plate of steel. The whole is then exposed to the sun for 24 hrs., whereupon the plate is wiped dry. If the plate remains as bright as before, indications are that there is no acid in the oil. Should dull spots appear on the plate, however, the opposite is true.

The flash test consists of heating a small quantity of the oil in a porcelain dish over a Bunsen flame, stirring it with a thermometer and applying a lighted match to the surface of the oil occasionally. The flash is the lowest temperature at which the vapors arising from the oil will ignite and go out again without setting fire to the oil itself, when a small flame like that from a match is brought to within $\frac{1}{4}$ in. of the oil's surface. From about 375 to 415 deg. F. is a proper flash point. Inasmuch as the temperature of the explosion in the cylinder exceeds several times that of the highest obtainable flash, it must be evident that even 100 deg. difference in the flash of two oils is of no avail so far as resisting the destruction which takes place in the combustion chambers of the engine is concerned. Below the piston heads, though the heat conditions are not so severe as above, there is also a chemical reaction within the oil. In fact, no lubricating oil exists that will not undergo chemical and physical changes when exposed to the great heat on both sides of the pistons of motor car engines. This results in all oils depositing a certain amount of sediment in the crankcase. However, there is a marked difference in the rate of sedimentation of oils of good and bad quality used under the same operating conditions and in the same en-

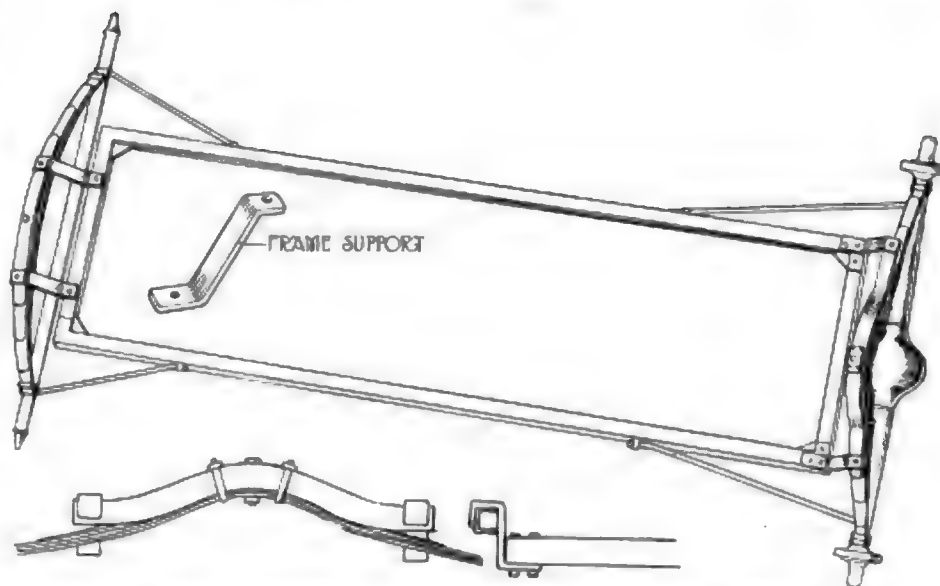


Fig. 3—Diagram illustrating method of lowering the frame of a Ford car

gine. Thus the rate of sedimentation in the crankcase is a measure of the durability and efficiency of the oil. To carry out this test in a practical manner, let us suppose that we have two yellow oils of the same viscosity, one being of poor quality and the other a high grade filtered oil. We will assume that the poor oil has been put in the engine and the latter run for a few hours under average driving conditions. A sample of the oil is taken from the crankcase and placed in a long glass tube for examination. It will be found that after a few minutes the oil will turn to a dense black. The same sample used for several days will, upon standing for a day or so, show a black sediment several times greater than that of good oil.

When an engine is run under the same conditions as that above but with an oil of good quality and a sample taken for examination, a marked difference will be noted in the appearance of the oil. In the first place the oil will have changed from its original yellow color to a grayish-blue by reflected light. If left to stand for 24 hrs. in a glass test tube a black sediment will show at the bottom, and the oil above the sediment will be red in color and equally serviceable as when fresh.

Other tests, principally the viscosity test, cannot be performed by the average motorist because laboratory equipment is necessary as well as experience in handling oils. And too, tests are not aimed always to get at the lubricating efficiency of the oil because that had to be arrived at by long experiment in every day use of the oil. Scientific laboratory tests are made to make sure that the oil is running uniform and up to a certain standard.

Lowering Frame on Ford

Muskegon, Mich.—Editor MOTOR AGE—Give drawing showing how a Ford frame could be let down so as to let the frame hang between the springs, making the car lower.—E. J. Frans.

A method of lowering the Ford frame is shown in Fig. 3 and shows four suit-

ably bent hooks to fit over the springs. These supports are riveted or bolted to the frame. Another scheme is shown at the bottom of the illustration and in this case curved pieces of metal are fitted over the springs and the frame supported from these by goose necks at each corner.

Details of Hour Record Talbot

Toledo, Ohio—Editor MOTOR AGE—What is the bore and stroke on a 1913 Talbot racing motor? Carburetor size and make? Clear diameter of valves and lift? Timing of valves? Type of cams and tappet? Number of crankshaft bearings and type? Was the crankshaft counterweighted?—Ralph C. Chesnutt.

The bore was 4 in. and the stroke $5\frac{1}{4}$ in. The carburetor was a Stewart-Precision. The valve and ignition timing is shown in Fig. 1. The timing is shown in degrees of crankshaft revolution and also in inches of the piston travel.

MOTOR AGE has no record of the type of tappets, cams or crankshaft bearings used in the Talbot.

Installing Manifold on Ford

Davenport, Iowa—Editor MOTOR AGE—Will the installing of a Wilmo manifold in a Ford increase the mileage per gallon of gasoline and the power of the engine?

2—Is there any danger of overheating the gas—especially on hot days, on account of there being no way to regulate the heat on the thin plate separating the intake and exhaust manifold?

3—What size lamps should be used in side and tail lamps when it is desired to run these from the magneto?—H. G. Struck.

1—According to information at hand it seems to do this.

2—No.

3—These lamps should be 6-volt for the older models and 9-volt for cars from 1915 on.

Light System Burns Out

Audubon, Iowa—Editor MOTOR AGE—The Auto-Lite system on my Chevrolet 15 Baby Grand burns out the lights when the engine is running and doesn't charge the battery. What is the trouble? Publish a wiring diagram.—Soren Nelson.

Evidently the trouble with your car is caused by a short circuit of the wiring. This is probably the cause of the generator not recharging the battery properly.

If this is not found to be the cause, we would suggest that the commutator on the armature be thoroughly cleaned; also see that the brushes are in good condition and making a proper fit on the commutator. Needless to say all wire connections should be absolutely tight. If all tests are of no avail, there may be an internal defect of the generator and it should be sent to the makers for inspection.

The wiring diagram is shown in Fig. 5.

METHOD OF HEATING MANIFOLD

Worn Chain Not Likely to Cause Pounding in Engine

Malta, Ill.—Editor MOTOR AGE—Is the Lewis motor used in the Comet car; if so where and by whom?

2—Describe the Lewis motor as fully as possible.

3—Can you suggest method whereby the intake manifold of the Continental motor may be heated for low grade gasoline?

4—Is it likely that the silent chain used in the Continental motor would cause a pounding noise after being run about 13,000 miles? Is there any way to tighten this chain?—Jacob Willrett.

1—The Lewis engine is used in the Comet car.

2—This engine was thoroughly described in the MOTOR AGE issue of March 29.

3—A suggestion for this is shown in Fig. 4 and shows a sheet metal cylinder, A, which is made to fit the intake manifold and held in place to the wooden end pieces B by round-headed screws. The pieces B should be made a snug fit so that they will fit tightly upon the manifold. A hole is made in one of the end pieces into which is fitted a length of flexible tubing to connect to the exhaust pipe to convey heat from the latter. In making the cylinder A it is a good plan to first make a paper pattern and fit it around the manifold to make sure that the metal will be cut properly. To assemble the device, place the wood end pieces on the manifold and wrap the metal cylinder A around them, holding the apparatus in place by winding several turns of wire around it. Holes can now be drilled for screws in the metal and the whole device permanently fastened in place by the screws. Should any large gaps occur where the wood pieces fit around the manifold, they can be stuffed

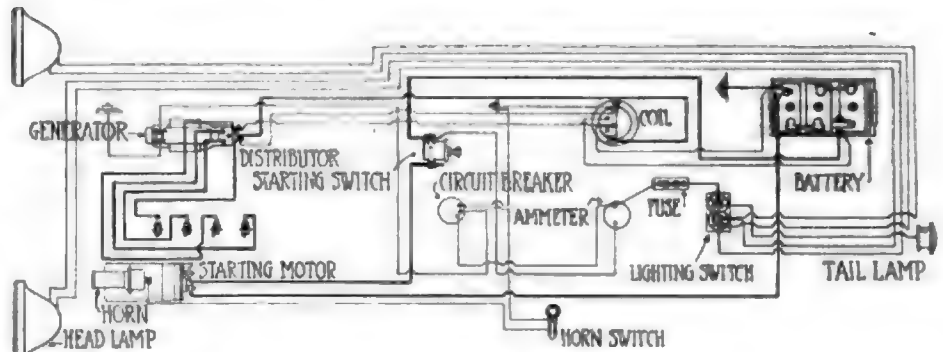


Fig. 5—Wiring diagram of 1913 Baby Grand Chevrolet

up by using asbestos yarn or some other form of packing. There are many ways in which the flexible tubing can be connected to the exhaust pipe, and one of the best ways is to make a metal stove to clamp around the exhaust pipe and fasten the tubing directly to it, having first cut a hole for the latter in the stove.

4—It is not likely that a worn chain would cause a pounding noise so much as it would a rattle caused by the chain slapping against the housing. There is an adjustable pad under the chain which can be regulated to take up wear. If, however, the chain is unduly worn, it is much more satisfactory to replace it with a new one.

Pump Is Probably at Fault

Illinois, Ill.—Editor MOTOR AGE—I have a 1912 model, four-cylinder, 30 hp. Chalmers that is heating very bad. We have overhauled the car and the motor runs perfect, ignition and timing O. K., cylinders clean, valves in good shape, pump seems all right. The core or honeycomb part of radiator does not heat at all, but the top, bottom and sides get very hot and the water will boil before the car has run a mile; in fact, the core is as cold as the fender or any part of car. I have used radiator cleaning compound and sal soda trying to improve the circulation of the water, but without success. What is the trouble? If radiator is clogged what can be used to clean it out? I have taken the drain cock out of bottom of the radiator and the water poured in the top runs a full stream at the bottom.—C. M. Kendall.

It is very likely that the water pump is not working properly. Or it may be a case of insufficient flow of water caused by the radiator being clogged with dirt or any other foreign matter which may have accumulated from time to time. Again it

may be a combination of both cases stated above. The fact that your radiator core does not get hot may be due to the fan action. Inasmuch as the fan sweeps only a part of the radiator, naturally the shell would become very hot if the pump was not functioning properly or if the radiator was at fault in any other way.

If it seems to be a case of a clogged radiator, the latter should be cleaned out by forcing through it, under pressure, a strong solution of lye and water, after which the radiator should be flushed out with clear water.

Holding Magneto to Engine Base

Manchester, N. H.—Editor MOTOR AGE—What inherent disadvantages are there in the use of a steel strap to hold down a magneto to its base, and, if any, what percent of electric energy would be lost?—Carl S. Fuller.

A steel strap is all right for this and no electric energy will be lost if one point is carefully observed. If the magneto were strapped down on iron or steel brackets and no precaution taken to use some non-magnetic substance like brass at the point A, shown by the shaded portion in the illustration, a small amount of the lines of force will return by way of the base and bolts instead of going through the armature, as shown by the arrows. Locating the magneto in place by means of a strap as shown seems to be a favorite method, inasmuch as it makes possible quick removal of the magneto, should this become necessary.

Lining Up Wheels on Car

Grand Rapids, Wis.—Editor MOTOR AGE—Publish a description and drawings if possible describing the way to line up the wheels of an automobile.—O. Garrison.

To line up the wheels of a car, it is necessary first to run it upon a level surface and turn the front wheels in a straight-ahead position. Place four chairs or saw horses so that one of them comes at each wheel of the car and about 2 ft. ahead and to the rear of the car. Two strings are then stretched so that they will be parallel with the frame of the car, the chairs being used to support the string. The strings should come to within about 1.8 or $\frac{1}{4}$ in. of the wheel felloes and at a height either just above or below the hubs. The distance from the strings to the felloes is measured on each wheel on each side of the hubs and any misalignment will manifest itself in this way.

Another way would be to use straight

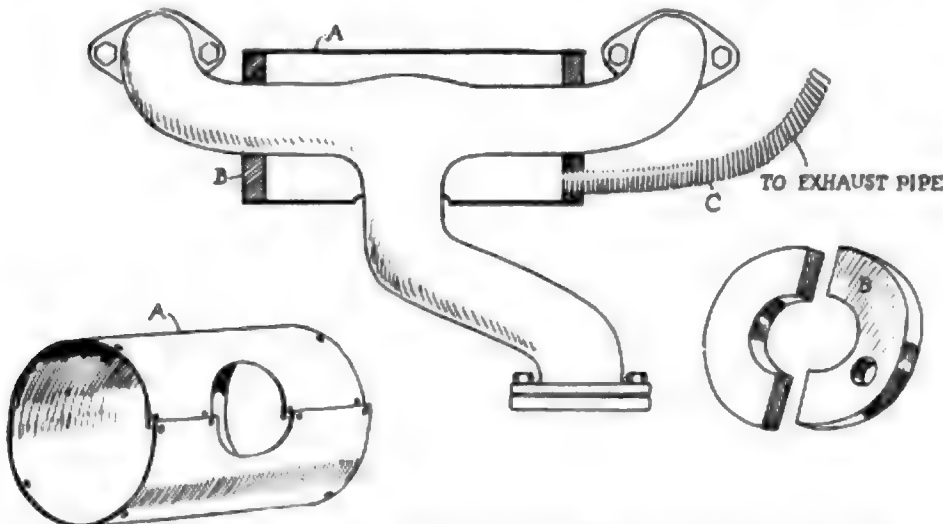


Fig. 4—Suggestion for method whereby the intake manifold of the engine may be heated

boards in place of the strings, the manner of checking the alignment being the same as in the case of the strings. Turn to page 43 of this issue of MOTOR AGE on which appears a more elaborate method of checking wheel alignment.

VARIED INFORMATION FOR READER

Erratic Running of Chandler Engine May Be Due to Dirt in the Gas Line

Timn, Iowa.—Editor MOTOR AGE—In your issue of Jan. 4, the Mercer Automobile Co. state that their motor is capable of 3500 r.p.m. Is this correct?

2—When the maximum number of r.p.m. are given, does it mean with the load of the car? In other words, does it mean running the car or idling?

3—What should the compression be in a Chandler Six motor 3½ by 5?

4—Does the A. A. A. refuse to allow racing cars of over 300 cu. in. displacement to run in races that they sanction? Why are some races restricted to 300 cu. in. and others to 450?

5—Is the rear axle housing on the Peugeot racer made of aluminum? If not, what metal?

6—Give a formula for finding the speed of a car when you have the r.p.m.

7—How many camshafts has the Peugeot racing motor? Are the valves operated by rocker arms?

8—How much compression should a Ford engine have?

9—My Chandler Six misses and runs by jerks when idling, and gets worse when warmer. What is the cause?

10—How close should the valves in a Chandler be set?—F. A. Work.

1—Such speed is well within the possibilities in such an engine.

2—This does not mean that such speed is attainable with the engine under load. The only value in such figures is to show the limit of safety. If an engine is capable of turning 3500 r.p.m. or over, it means that it is extremely well balanced and well apportioned as regards valve sizes, etc., although it will not turn nearly this fast when driving the car. If you were to assume that a car geared 3 to 1 and equipped with 34-in. tires could be driven at an engine speed of 3500 r.p.m. then the car would travel about 130 m.p.h.

3—About 55-lb. gage.

4—Yes. All A.A.A. races for professional drivers are restricted to this piston displacement. It gives a more even form of competition and all in all a more satisfactory race.

5—No. The housing is pressed steel.

6—You cannot find the speed of a car by knowing the revolutions of the engine only, for the size of the tires as well as the gear ratio must be taken into consideration also.

7—Two. Yes.

8—About 55 to 60 lb.

9—This might be caused by any number of defects in either the ignition, carburetion or cooling systems. We would suggest that you look over the gasoline line and carburetor to see if by chance the erratic running is due to dirt in the line. Carbon deposits, improper seating valves, incorrect mixture, are among the other things to check up on.

10—According to the Chicago office of the company this should be about .004 in.

Wiring of Oakland

Media, Pa.—Editor MOTOR AGE—Kindly publish a diagram of the Delco generator which was used on the 1914 model 35 Oak-

land touring car. In having the magnets recharged I have disconnected the wires of field and armature winding, also have lost a memoranda which I made of the poles of the magnets looking toward the coupling from the water pump whether the north or south pole was on the right-hand side. In publishing the diagram I would like to have it shown without the voltage regulator under the magnets which burnt out after about six months' running.

2—I wish to use a Delco reverse current cut-out between the generator and battery. I have tried but they act as a drag on the motor and slow it down.—Francis Richardson.

1—This was published in the Readers' Clearing House department, MOTOR AGE, issue of May 24.

2—It is impossible to tell from your pen sketch where the trouble may lie.

Converting Buick Six Into Speedster

Fort Morgan, Colo.—Editor MOTOR AGE—Illustrate the different ways in which noted racers hold their steering wheels while racing.

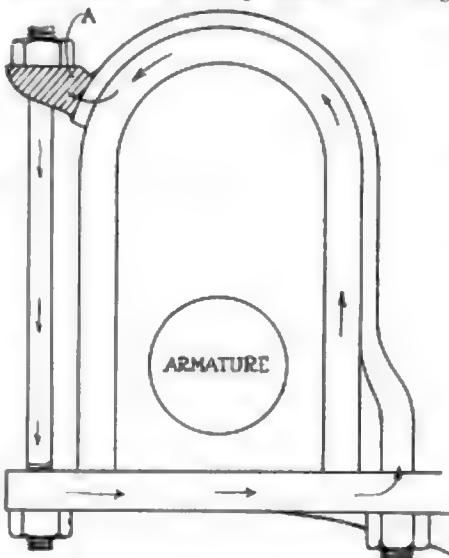


Fig. 6—Holding magneto to engine base

2—Is the new Emerson car being manufactured?

3—What is the bore and stroke of the new Emerson?

4—Give suggestions for converting a Buick Six, model 55, 1914, into a speedster.—Frederic Belle.

1—Pictures showing this were published on page 49 of the May 10 issue of MOTOR AGE.

2—No.

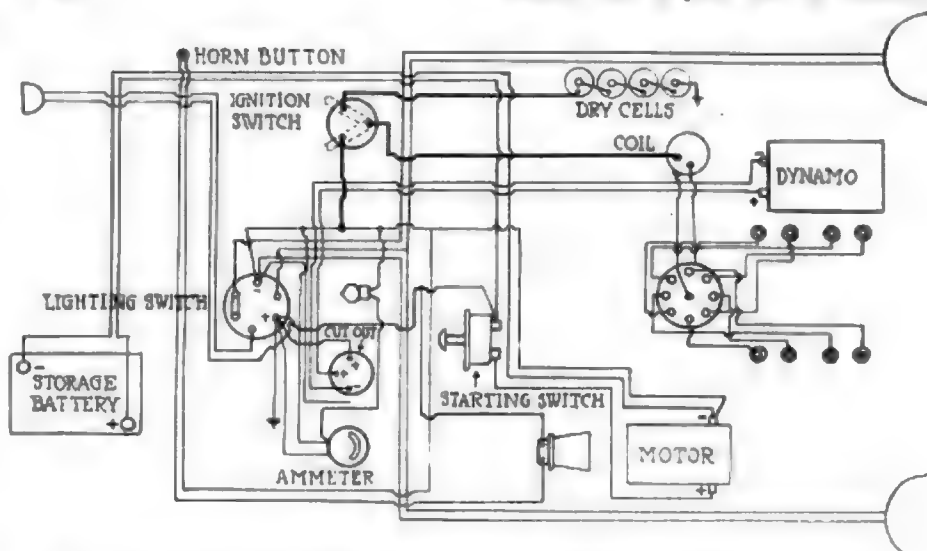


Fig. 7—Abbott-Detroit wiring diagram, which is similar to that of the Michigan Model K

3—3¼ by 4 in.

4—Suggestions for this have appeared in recent issues of MOTOR AGE, and reference to these will no doubt give you some ideas as to what can be done in the way of converting earlier models into speedster types.

Wiring Coil on Michigan

Algona, Ia.—Editor MOTOR AGE—Publish wiring lighting system for Model K, Michigan.

2—Can I connect the Briggs coil to storage battery without damage to the coil.

3—How should it be connected, to both wires or one wire?—C. R. Madson.

1—A wiring diagram of this car is not available, but the Abbott-Detroit wiring diagram shown in Fig. 7 will give an idea of the layout used in the Michigan Model K, inasmuch as the cars had about the same system.

2—It is not likely that you can do this successfully.

Demand for Ford Mechanics

Pekin, Ill.—Editor MOTOR AGE—Is there any demand for first class Ford mechanics? What is the average salary?—George Lohnes.

There is no good reason why first class Ford mechanics should not be in demand, considering the number of Ford cars used. The wages of mechanics vary but usually average from about \$20 to \$30 per week.

Sliding Transmission for Mets

Jackson, Miss.—Editor MOTOR AGE—What make or type of sliding transmission can be used to substitute the friction drive of a Mets 1913 roadster? Where can same be obtained?

2—State the cause of the magneto burning out on a Willys-Knight Overland.—Lawrence Auto Repair Shop.

1—There is none that we know of which could be successfully installed.

2—We cannot see any reason why the magneto should burn out unless by some chance the storage battery current was sent through the coils of the magneto for too long a time. It may be that the magneto has some internal defect or that the magnets have become de-magnetized.

Not Advisable to Fit Disk Wheels

Shawnee, Okla.—Editor MOTOR AGE—I would like to rebuild my model H, four-passenger Sells into a speedster. Publish a sketch giving me an idea how it will look.

2—Where can I buy parts for this car?

3—Do disk wheels increase the speed and would you advise them on this car?

4—What kind of paint does the Chandler





Lubrication is by force feed. There is a pressure gage on the dash and a level gage on the side of the crankcase. An interesting feature of the lubricating system is found in the breather arrangement. The breather pipe leads directly to the overhead-valve compartment. This means that all oil spray is utilized in lubricating the moving parts in this compartment rather than being sprayed about the hood.

There are only three visible moving parts on the entire engine. These are the fan, fan belt and fan pulley. The overhead-valve compartment is capped over by a sheet-metal case. The fan is four blade and the belt of the V-type. Cooling is by thermo-syphon.

The bearings of the crankshaft are of the following dimensions:

Front 2 $\frac{1}{8}$ by 2 $\frac{7}{8}$.
Center 2 $\frac{1}{4}$ by 3 $\frac{1}{4}$.
Rear 2 $\frac{1}{4}$ by 3 $\frac{1}{4}$.

The three camshaft bearings are of equally large proportions. The sizes are:

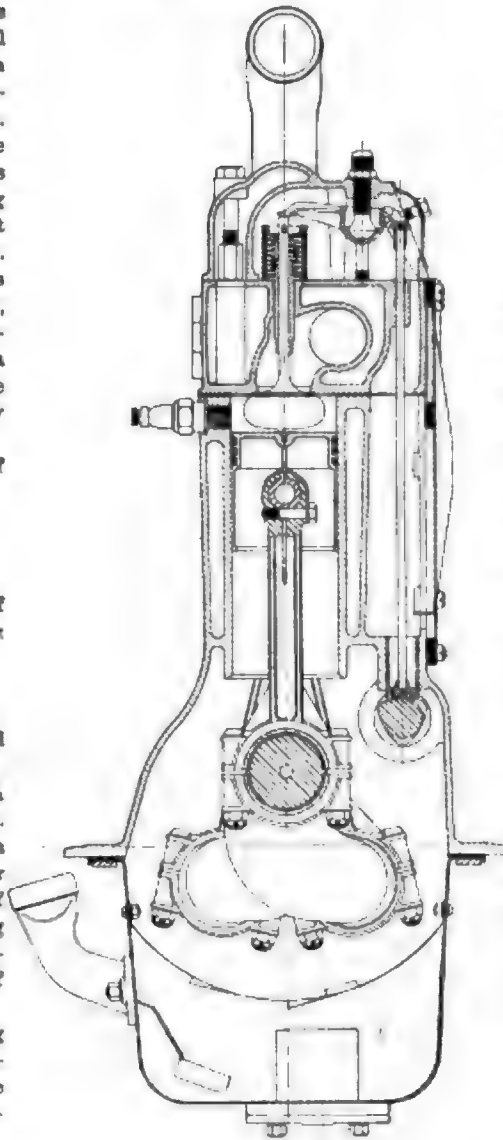
Front 1 $\frac{1}{2}$ by 2.
Center 1 $\frac{1}{2}$ by 1 $\frac{3}{4}$.
Rear 1 by 3.

The connecting rods are babitted and brass lined, size 1 $\frac{1}{2}$ by 2 $\frac{1}{4}$.

As previously stated the valves are 1 $\frac{1}{4}$ in. in the clear. They have a $\frac{3}{8}$ -in. lift.

With the exception of the engine and a distinctly new design of the body, the car retains most of the principles of design of the previous chassis. There is now a Borg & Beck clutch, spiral-bevel drive and roller bearings in the front wheels instead of the cones.

The carbureter is a 1 $\frac{1}{4}$ -in. Stromberg with hot-air attachment. Starting, lighting and ignition is Delco with Bendix drive on the starter, and there is a Willard battery.



A tubular propeller shaft takes the drive from a three-speed gearset and transmits through spiral bevels to a floating axle. Torque and propulsion effort are taken up by the Hotchkiss principle.

The springs are 37 $\frac{1}{2}$ in. in front and 53 $\frac{1}{2}$ in the rear, both semi-elliptic. The wheelbase is 117 $\frac{1}{2}$ in.

Two body styles are offered, the model 75 which is a five-passenger touring car, and the model 70 which is a one-seated three-passenger roadster. Both models are roomy with deep, soft French-piped Turkish upholstery.

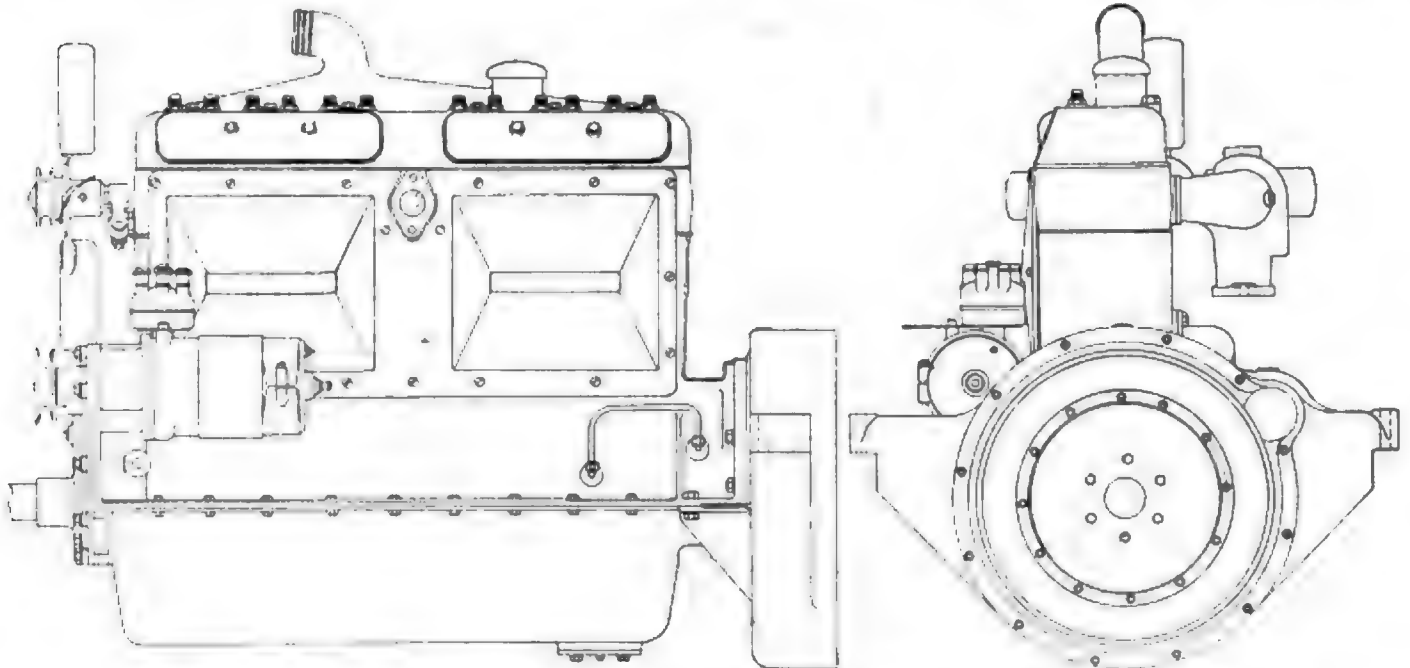
Included in the equipment are a Van Sicken speedometer driven from worm gears at the rear of the gearset and a Kellogg tire pump direct connected to the gearset with a hose connection in a flush plate on the floor board. The price is \$1,385 f.o.b. Freeport. The car is the product of the Freeport Motor Branch of the Moline Plow Co.

CHALMERS HOLDS MEETING

Detroit, June 18—The Chalmers Motor Co. is holding a meeting to-day of sixty of its largest distributors and branch managers and fifteen zone managers who will consult with Chalmers officials and review the new series of Chalmers bodies, which were recently announced in the last issue of MOTOR AGE.

FORD PASSES 2,000,000 MARK

Detroit, June 18—Thursday, June 14, was a record day at the Ford Motor Co. plant, as it witnessed the production of the two-millionth model T Ford car, the Ford Motor Co. having manufactured exactly 2,000,000 of its cars between the time of its inception and last Thursday.



Above is a cross-section view of the Salient Six showing the location of the intake manifold in the center of the head. Note that all valve mechanism is inclosed. Below, side and front views. The fan, pulley and belt are the only visible moving parts.



The Accessory Corner



Vulcan Replacement Springs

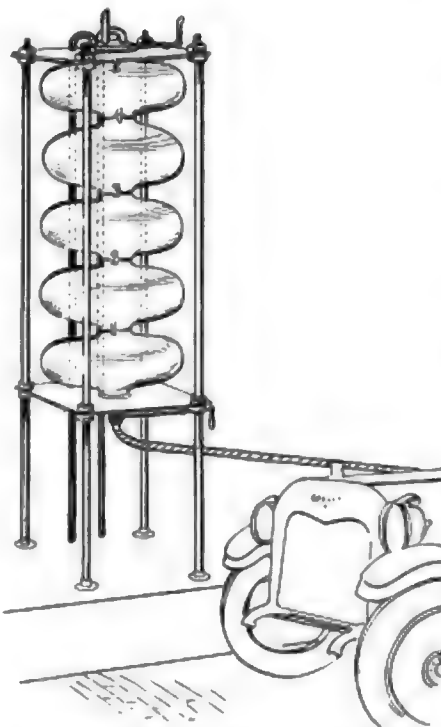
THE Jenkins Vulcan Spring Co., St. Louis, Mo., states that it carries in stock a total of 90,000 replacement springs, covering 588 different types for all popular-priced cars. Vulcan springs are made of fine grain steel, carefully heat-treated and tempered in oil, showing a high elastic limit and long life, it is claimed. The eyes of Vulcan springs are reamed for the spring links, and the springs are thickly graphited between the leaves before they are assembled. All springs are given a coat of black paint. To dealers who buy an assortment of twenty springs, the company gives a useful display rack. A smaller rack capable of holding thirty-two springs is furnished with an assorted order for twelve springs.

Lamar Kerosene Vaporizer

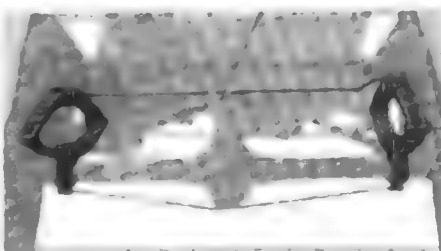
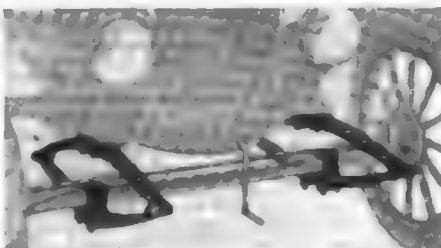
This system of vaporization uses gasoline in starting or priming the engine after which kerosene is used for continuous running. More power to the engine is claimed by the use of the Lamar vaporizer, as well as greater mileage. It is also claimed that carbon deposits and fouling of the plugs are negligible factors when the engine is equipped with this vaporizer. The device consists of a special manifold and means of heating it. No new holes are bored for attaching the manifold and the bolts which hold it in place use the holes that were used for the original manifold. The only holes needed are two through the dash to accommodate the $\frac{1}{4}$ -in. pipe going to the primer. At the end of the main fuel tank a smaller tank is provided to hold gasoline for priming or starting the engine. When the engine is sufficiently warm the supply from the small gasoline tank is shut off and the valve of the main tank holding the kerosene is turned on.

Stewart V-Ray Searchlights

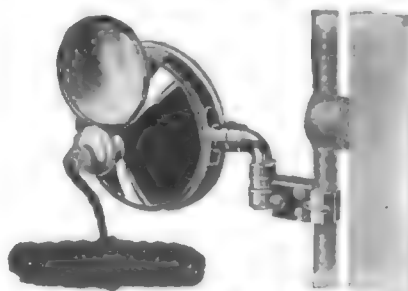
A new Stewart product known as the V-Ray searchlight has been announced by the Stewart-Warner Speedometer Corp., Chicago. The case or body has a solid flanged front, closed in a manner to seal the glass to the reflector, thereby preventing the entrance of both moisture and dust. This is said to keep the reflector perfectly clean at all times. The case itself is but 6 in. in diameter, outside measurement. There is a focusing device of sufficient range to permit the use of all types of G12 or G16 $\frac{1}{2}$ lamp bulbs of both vacuum or gas types. The switch is located in a convenient place and the back of the light equipped with a 3 $\frac{1}{2}$ -in. reducing mirror, installed in such a position that the traffic in the rear can be seen without swinging the lamp into the car. The mirror is furnished at no extra charge. The V-Ray



Harper measuring device for gasoline, used with any kind of pump



Rest-More spring suspension adjusted to Ford car in front and in the back



The House concern has added this model, the Junior No. 15 spotlight

searchlight is supported below the bracket instead of above. It has been learned, it is said, that when the spot light is supported above the bracket, the light easily vibrates out of position. When hanging below the bracket, it is declared that it cannot vibrate out of position and presents perhaps a more pleasing appearance. Other features include mounting of the joints so that no lubrication is required and a universal bracket which fits practically every type of windshield. The lamp is neat in appearance and small in size, making possible the use of two searchlights, one on either side of the car, in place of headlights or dimming devices; so designed that it can be installed on either right or left side of the windshield without alteration of the bracket and so shaped that storm curtains can be fastened to the windshield around the bracket. The outfit is finished in black enamel with nickel trimming.

Auto-Reel Spotlight

A motor car lamp that can be used as a spotlight, trouble lamp or driving light and called the Auto-Reel spotlight is made by the Anderson Electric Specialty Co., Chicago. The adjustable cord reel is located in the ball casing just back of the lamp and forms a part of the bracket. When in the position shown, the lamp can be used as a spotlight or driving light. To use as a portable light, it is only necessary to unscrew the knurled nut and withdraw the lamp to any desired length up to the limit of the cord, which is 12 ft. long. The cord reel operates like an ordinary curtain roller. The lamp and bracket are finished in black enamel. A clear glass lens is fitted backed by a 21 cp. nitrogen bulb in a silvered parabolic reflector of carefully determined contour to increase the light rays. An on and off switch is conveniently located at the back of the lamp. A 3 $\frac{1}{2}$ -in. reducing mirror can be had for 50 cents in addition to the original cost of the lamp, which is \$7.50.

Rest-More Spring Suspension

The Rest-More Spring Co., Ottawa, Ill., has brought out a new method of spring suspension for Ford cars whereby full elliptic springs are used both in front and rear, thus doing away with the cross springs of the Ford. It is claimed that the car will steer much easier and hold the road exceptionally well when equipped with a set of these springs. Primarily the apparatus consists of two forgings which clamp into the frame of the car in place of the old springs and are held in place by the usual Ford spring clips. These forgings extend outward to a width somewhat greater than that of the frame, being also









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ANNOUNCEMENT

As announced in a previous issue Hi Sibley, Motor Age's special representative, spent some time in Japan studying motor conditions and will write a series of articles to appear from time to time. The first of this series will be a feature of Motor Age next week.



A car may largely be known and judged by the character of its electrical accessories—provided the investigator be well versed in the distinctive marks of quality. In the matter of magnetos and lighting generators, practice and precedent provide an unfailing index to dependability—

"NORMA" BALL BEARINGS

Which are used almost without exception by all makers of high-grade magnetos and lighting generators—such magnetos and such generators as are standard equipment on motor cars of the better class. You are seeking assurance of serviceability? Here is one factor:—

Be Sure. See That Your Electrical Accessories Are "NORMA" Equipped.





of such highways as will relieve the railroads of an excess tonnage and to extend mileage and connect stretches already in existence as quickly as possible is to be guilty of a criminal neglect approaching treason.

We must have permanent roads to sustain in virile condition the elements of national life and strength behind the firing line, but in no less degree can the highways be utilized in many eventualities for actual military requirements. Nor can the vicissitudes of war lessen by a single farthing the value of the dollar now expended; it will be one of continuous worth in the peaceful days to come.

Mines have been idle, manufacturing plants have ceased operations for days, grain, so badly needed, remains in the farmers' cribs, and all business is disturbed. Reflecting results are felt in lessened efficiency on the one hand and higher prices for all purchases needed for our daily requirements on the other. Our whole industrial fabric is being sapped of the vitality that we need and upon which the great strength of the country rests and upon which we must depend for continued ability to endure the coming strain.

The United States Government feels the existence of this industrial condition by giving preferential right of way over railroads to commodities for direct and immediate war needs and very likely will include road-making materials in that category. As the necessities for war material become expanded the general industries of the country will be further disturbed by the increased use of present transportation facilities. This situation surely will become intensified by the great increase of crops so wisely urged upon the country, which must be moved if they are to serve the purpose of feeding the thousands now so anxiously hoping for a further lease of life thereby.

Question of Bread and Meat

It is quite apparent that transportation is no longer a problem of mere convenience; nor is it one of merely commercial advantage. It is now a question of bread and meat—and more. Upon it rests the hope of an early conclusion of the war. It is a question of vital and immediate concern for the salvation of the country; the guarantee of its ultimate endurance. In what manner and how shall relief come? Shall it be either a debate, or procrastination, or shall it come at all? If we have been unable to deliver a short crop how shall we deliver a long one? Without making any attempt to forecast what the possible construction of roads this year would do as a solution, it is evident to everyone that all-year roads are of vital importance and to that end some facts and figures concerning our present mileage of permanent roads and a word about our system in general are of interest.

The value of roads has been recognized since civilization began. The oldest roads of which parts still remain are those of the

Cuyahoga county, Ohio, system of brick roads, which is most highly organized example of this construction in United States. The mileage totals over 300



Romans and those through France made by the Crusaders. The word "road" has an ancient derivation. It comes from the German word *reiten*, meaning "to ride," and is closely connected with the Gaelic word, *reda*, meaning "wagon."

In the ancient days the economic value of roads, in its broadest sense, did not enter into the equation. Commerce, travel, warfare and the development of military control of distant countries depended then as now on the length and quality of roads. In the olden days roads were developed chiefly to facilitate the movement of troops and not the development of commercial and social welfare. Is history repeating itself? We, as a nation, have come to realize that permanent roads are of great military advantage.

The first highways constructed in the Western Hemisphere of which there is record were built by the ancient Incas in Peru. The development of roads in America has been very much slower than in other countries. Our chief progress has been made since the advent of the motor vehicle, but the motor vehicle is far ahead of its time if we use our present roads as a gage of time. In the colonies in the East the people came from England where the roads were very bad and hence did not realize the value of improved highways. The generations that followed them seem to have been as slow to realize the importance of high-

ways; perhaps it has been an inherited trait.

The first important highway in the Colonies was the old York road of 1711, which connected New York with Philadelphia. No less a person than the Father of Our Country, George Washington, laid out the first military road in this country in 1754, which led from Virginia across the Alleghenies to the Ohio Valley. Organized road making, however, did not begin until 1800. The first turnpike in the country and the first macadam road in the United States was the Lancaster Turnpike between Lancaster and Philadelphia, Pa.

Where Brick Roads Are Necessary

The early turnpikes were owned and managed by private corporations and when financial difficulties arose, which was often, the roads reverted to the state. The first national road was started in 1811. This road, known as the Cumberland or National road, connected Cumberland, Md., with the Ohio and Mississippi rivers. It was 700 miles long and cost the government \$7,000,000. There have been in this country what might be termed eras of road-building since, but none that ever approached the era that was born with the inception of the motor vehicle. It no longer is a question of good roads, it is BEST roads and best roads means PERMANENT roads.

When we wish to emphasize anything we usually look for its most highly organized example and point to that as what can be done. That is what the writer is about to do. Cuyahoga County, Ohio, of which Cleveland forms a large part, probably has more mileage of brick roads than any other area of the same size in the United States. California can boast of having the greatest mileage of concrete roads. These two types of highways—

Tractive Resistance

Pounds pull necessary to move 1 ton over various classes of roads:

Loose sand	280 to 360
Loose gravel	300
Dry gravel	258
Best gravel	60 to 100
Dry dirt	75 to 150
Best dirt	106
Macadam	40 to 60
Asphalt	30 to 60
Concrete	30 to 60
Brick	40 to 60





Adopts New Motor Fuel

London Specifies "War Spirit" as Only Brand That Can Be Marketed

Gasoline Concerns Have Pooled Supply for Distribution

LONDON, May 30—Instead of several brands of gasoline being sold throughout England, the government has decided that only one brand is to be marketed, and it will be labeled "War Spirit." Heretofore some of the different brands of gasoline have been Pratt spirit (American), Shell spirit (Borneo) and various other brands. The new War Spirit represents the supply of fuel which has been pooled by the different gasoline concerns for distribution. Instead of gasoline being sold in green or red cans as formerly, it is to be marketed in khaki-colored tins.

The use of motor cars throughout the British Isles gradually is being restricted. One of the latest restrictions is a prohibition on renting or hiring of cars. Since the start of the war a big business has been done in hiring. Many private owners who have found it necessary to lay up their vehicles have hired cars from garages for trips through the country. Now no cars can be hired except under a special license, which is only issued to a certain class of people whose work comes under specified headings. The police have organized themselves and made many arrests for violations of this rule. At times as many as six barriers of this police nature are encountered in 100 miles. The private motorist is not complaining loudly over these restrictions as they know they are not imposed until absolutely necessary. The police treat all cases with the utmost consideration and courtesy, which helps the situation very much.

The tractor advocacy has accomplished an amazing result, one which seemed impossible six months ago. England is going to plow three times as much land as ever before, and it is expected that when farmers once are started on this increased farming schedule that they will not drop back to their old time pace. As only a comparatively small percentage of farmers in England are car owners it is expected that this intensified farming will result in a greatly increased war market with agricultural classes. Unquestionably motor cars will sell to the farmers in greater quantities than ever before.

ARMY TRUCK BIDS

Washington, D. C., June 22—Eighty-seven makers are represented in the bids for the first 35,000 army motor trucks requested by the War Department. That makers are ready to contract for many times the Government's present require-

ments is shown by the bids of three companies, Pierce-Arrow, Hurlburt and Nash, each offering to build the whole 35,000. Three concerns offered to build trucks at cost plus 10 per cent, and two offered to produce ten trucks a day for an indefinite period. Some makers are ready to deliver at once and others set varying delivery dates, ranging to six months. Quick delivery is expected to carry considerable weight in placing contracts. It is estimated that more than 40,000 motor trucks are on the entire western front in Europe. An order for 35,000 trucks by the American Government would result in putting the United States on a par.

FORD RUSHES AMBULANCES

Detroit, June 22—The contract for 2400 ambulances for the United States War Department involving \$1,500,000 and which was reported last week in MOTOR AGE, is being rushed to completion by the Ford Motor Co. The order announced by Frank L. Klingensmith, vice-president of the company, is the first one given to Detroit makers.

MOTOR AMBULANCES IN KENTUCKY

Louisville, Ky., June 21—Motor ambulances for use in the United States army, it is reported, will be assembled at the plant of the Kentucky Wagon Mfg. Co. in this city. This is the arrangement that has been made by the quartermaster's department at Washington. The parts of the ambulances made by many factories will be shipped to Louisville for assembly. The contract made between the government and the Kentucky Wagon Co. specifies several thousand cars a year for several years and will require the employment of many expert mechanics in addition to those already connected with the company.

HARRY L. SHEPLER RESIGNS

Toledo, Ohio, June 22—Harry L. Shepler, vice-president in charge of production of the Willys-Overland Co., will resign July 1. Mr. Shepler's plans for the future are not yet ready for announcement. He has wanted to resign from the Willys-Overland Co. for several months owing to his desire for a complete rest. Harry L. Shepler has been associated with the industry since its inception and has been connected with the Willys-Overland Co. since 1909, first as superintendent, then as general superintendent, and finally vice-president in charge of production. He is one of the most important figures in the motor car industry.

W. H. Birchall, superintendent of the Willys-Overland Co. plants, has been appointed general superintendent to succeed Mr. Shepler.

MUSKEGON TO MAKE TRUCK

Grand Rapids, Mich., June 23—The manufacture of a line of trucks of 1 and 2-ton capacity, will be undertaken by the Muskegon Engine Co., Muskegon.

N.O.T. Boosters to Meet

Pueblo Gets Convention by Hard-Surfacing Road to Kansas Line

Judge J. M. Lowe, Father of Association, Resigns

KANSAS CITY, Mo., June 23—The annual convention of the National Old Trails Road Association will be held in Pueblo, Colo., Aug. 16-17, 1917. Pueblo gained the convention by steps to hard-surface the National Old Trails Road from Pueblo to the Kansas line. Proceedings are now under way for the hard-surfacing of the road across Kansas, with the exception of two or three counties and petitions probably will be started in these counties this summer. The chief business of the convention will be the election of a president to succeed Judge J. M. Lowe, who has resigned.

Judge Lowe has been the godfather, father, nurse and sponsor of the National Old Trails Road Association. It was organized April 17, 1912, and he was elected president. He has served ever since. The purpose of the organization was declared to be the permanent construction of a trans-continental highway from Washington, D. C., to Los Angeles, Cal., but there was not a cent in the treasury to prosecute this purpose, there was not a mile of road built and maintained in such a manner as to be recognized as a good road.

During the last five years the highway has received an average of \$5,516.41 annually and has to show as results more than \$10,000,000 expended in the permanent construction of the road. The highway is practically complete from Baltimore and Washington through Maryland, Pennsylvania, West Virginia, Ohio and Indiana, and in Illinois its building is assured by a recent road bill. In Missouri the legislature permitted the suggestion of adoption of the Maryland statute requiring the state to pay half the cost and the county through which it runs, half. In Kansas the constitution prevents the state from contributing to any internal improvement, but the people are actively urging county and district bond measures. California has built nearly half the road, and the balance is provided for in state bonds already issued. Arizona, New Mexico and Colorado will finish their part within 1918.

ANOTHER FLYING FIELD

Washington, D. C., June 25—The Signal Corps announces the letting of the contract for the fourth of the new Government flying fields, to be built at Belleville, Ill., 23 miles from East St. Louis. It will be a standard two squadron field, accommodating 300 student flyers, with the requisite number of officer instructors, me-

chanics and enlisted men, and providing hangars for seventy-two training planes. Construction of the buildings and the preparation of the field will begin immediately.

The location of the fields already announced are Dayton, Ohio; Mount Clemens, near Detroit, and Rantoul, near Champaign, Ill. The Government's present plans contemplate the fifth contract in about two weeks, and the remaining four of the nine fields already authorized at successive intervals of the two weeks thereafter.

The preparation of the three fields already started has been made an emergency job, and the Chanute Field, at Champaign, Ill., is already nearly done. The contract for Chanute Field was let May 24, and work began May 27. Substantial progress has also been made on the big four-squadron Wilbur Wright field at Dayton and the Seldridge Field at Mount Clemens. The authorities hope to have men flying on all three of these fields by the middle of the summer.

DISBROW ADDS A SPECIAL

Cleveland, June 23—The "Quad Express" was chosen by Louis Disbrow for the new addition to the line of Disbrow Specials. It is a four-passenger car, while its speed ranges up to 87 m.p.h., which is responsible for the "express" part of the name. The present Disbrow models are all two-seaters, with the bucket style of arrangement. A novelty about the quad express will be the painting of the radiator shell the same color as the wheels. Notwithstanding the two extra seats, the new creation will possess the same racy appearance as the present line of two-passenger semi-racing sport Disbrow cars.

COMMONWEALTH TRUCK SERVICE

Chicago, June 25—The Commonwealth Edison Co., of Chicago, has come to the rescue of the electric vehicle owner with a plan to give complete garage and maintenance service for commercial electric vehicles at specific rates per annum on long term contracts. The proposed service will cover ordinary storage, including the cleaning and care of vehicles, besides charging the battery and maintaining the wearing parts, such as tires, battery, and mechanical parts.

The maintenance will cover minor repairs of all kinds as well as the renewal of tires and battery when worn out. The body will be painted at specified intervals, and retouching and varnishing will be done. New trucks only will be accepted for the service. The rate will be a flat figure per annum, payable monthly. Trucks equipped with batteries larger than the standard will be charged for at proportionately higher rates. The working radius of the truck the flat rate is to cover is that amount of service obtainable from one charge of the battery daily. Additional charging will affect the flat rate.

Organize New Drexel

Assets of Old to Be Purchased and Production to Be Continued

Will Use Ferro Eight Engine Instead of Sixteen Valve

CHICAGO, June 26—Affairs of the Drexel Motor Car Corp., implicated by the failure of two South Side Chicago banks and which seemed about to be smoothed out, reached a state of chaos in a stockholders' meeting held last Sunday, with the result that a new company is to be formed to take over the Drexel that will have an entire new official personnel and will bring out a new car equipped with an eight-cylinder Ferro engine instead of the sixteen-valve engine formerly used. The new car will sell at a price around \$1,295.

Two weeks ago Judge Carpenter in the Federal Court appointed a receiver for the Drexel Motor Car Corp. at the request of certain stockholders. In the meeting held last Sunday a new managing committee was appointed which will organize a new company to be incorporated under the laws of Illinois for \$300,000, all of this stock to be absorbed by the present Drexel stockholders. This company will buy the assets of the old Drexel and continue operation. By forming a new corporation a large amount of stock which it is said brought little if any revenue to the old company will be eliminated. There will be no stock which does not represent actual physical assets of the new concern.

Tests have been made with the Drexel car equipped with an eight-cylinder Ferro engine for several weeks, and the new company will go ahead with the Drexel production using the Ferro engine, according to members of the committee now organizing the new company.

A. J. Farmer, former president of the company, and officials of the two defunct banks who held large blocks of stock in the Drexel Motor Car Corp., will have no connection with the new concern. Plans are under way for utilizing at least part of the factory for the manufacture of munition. According to the committee's report last Sunday, \$350,000 was received from the sale of stock in the Drexel, \$213,045 in materials and debts of \$106,070, leaving an equity of \$106,974 for the holders of \$1,300,000 par value of stock.

WAGNER-HOYT FAILS

New York, June 25—The Wagner-Hoyt Electric Co., organized in June, 1916, has gone into bankruptcy. All its merchandise, fixtures and machinery will be sold at public auction at the factory and salesroom, 1902 Broadway, July 2, under the supervision of the Supreme Court of New York.

The company was organized to manufacture complete electrical equipment for motor cars and market it as a unit. A. F. Wagner, formerly president of the Wagner Specialties Co., and Frank Hoyt, formerly chief engineer of the Simms Magneto Co., together with Gerald Laugh, formerly connected with the Burroughs Adding Machine companies, were the incorporators. Mr. Wagner was president and general manager, Mr. Hoyt treasurer and chief engineer and Mr. Laugh secretary. The concern obtained a license under the patents of the late H. Ward Leonard covering the control of electric lighting systems on motor cars and in addition to producing the complete electrical equipment of a car, including starting and lighting, ignition and lamps, also marketed a new type of storage battery.

STUTZ ELECTS OFFICERS

New York, June 23—At the organization meeting of the board of directors of the Stutz Motor Car Co., officers for the ensuing year were re-elected with the substitution of W. N. Thompson as treasurer, who takes the place of G. H. Saylor, resigned. An executive committee was selected, composed of Harry C. Stutz, Allan A. Ryan and Sherburne Prescott. At the annual meeting of the stockholders, W. N. Thompson of Indianapolis and John J. Watson, Jr., of this city were elected directors.

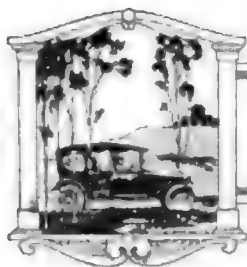
Net profits of the Stutz company for the first 6 months of this year, with the latter half of June estimated, approximates \$600,000, equal to \$8 a share on the 75,000 shares of stock outstanding. This total of approximately \$600,000 net profits in the first half of this year compares with \$649,042 net profits for the entire calendar year 1916.

ATLAS WINS HOBBS SUIT

Chicago, June 23—The Atlas Specialty Mfg. Co. has won the suit brought against it by the Hobbs Patent Co. in the District Court of the United States for the Northern District of Illinois, Eastern Division, Nov. 22, 1915, for infringing on its patent No. 901,616, covering radiator and hood covers. Judge Carpenter on Oct. 23, 1916, decreed the Hobbs patent void for want of patentable novelty. This decision was appealed only to be sustained. The Hobbs company then filed a brief for rehearing with the result that the Court of Appeals' decision was affirmed and the suit settled in favor of the Atlas company.

DENEEN ANNOUNCES NEW MODELS

Cleveland, Ohio, June 22—The Deneen Motor Co., maker of the Denmo truck, announces the following models: Three-quarter ton, model 12, three different types of bodies, \$995, \$1,020 and \$1,065; 1½-ton, model 10 chassis, \$1,490; 2-ton, model 15 chassis, \$1,790, and a 3-ton, model 14, at \$2,325.



EDITORIAL PERSPECTIVES



Airplane Status

WITH \$600,000,000 practically agreed upon for airplane manufacture for the war; with six of our colleges at present conducting classes on instruction of aviators; and with many large aviation fields in the process of construction, it is conclusive that the airplane has passed the stage of temporary interest and has become an accepted permanent means of transportation. Today the airplane is a vehicle of war, but tomorrow it will be a vehicle of transportation in pursuits of peace. The tens of thousands of airplanes in use in the war will not be laid aside when peace is signed. The great airplane industry that is being built up in almost magical strides will not subside with the signing of peace. The airplane has demonstrated that in the war it is as safe if not a safer vehicle of transportation than the motor car for practically all speeds.

EUROPE already is wrestling with the problem of what to do with her thousands of army planes when the war is over. Mail routes already have been planned. It is possible to have rapid personal transport over distances of 1,000 miles where speed is a great requisite and cost a secondary consideration. There is a possibility for a great parcel transportation system, particularly for conveying documents which call for the greatest possible speed of delivery.

IT is not at all impossible that aerial service may fill a position compared with railroad transportation that the telegraph fills today compared with the mail system. Speed in the transmission of mails by airplane may be as essential as the long distance telephone between San Francisco and New York or the cable be-

tween New York and London or Paris. The airplane unquestionably brings a new era of speed into this field. With some battleplanes capable of maintaining 125 m.p.h. and capable of doing night service, of flying irrespective of the weather, it will be possible to give quick mail service or parcel delivery among the many cities in the country.

THESE are days of great changes. These are days when revolutions, not only political but economical, are taking place. These are days when we are living so close to epoch-making events that we do not get the perspective and fail to grasp the magnitude of the changes as those who live fifty years later will. The airplane is essentially the development of the present war, and since it has demonstrated its speed, its dependability and its all-weather ability, it cannot but take a permanent place in transportation systems.

IT is not impossible to foresee the time when multi-millionaires, instead of hiring special trains to rush from one side of the continent to another, will make the trip by airplane. To them speed will be essential and cost secondary. It is possible to foresee the time when eminent surgeons may be called upon to make airplane trips from New York to Chicago or from Denver to San Francisco to save life. It is possible to see the time when in case of serious land accidents in inaccessible sections medical aid may be furnished by airplane. There are multitudinous fields demanding more rapid transportation than afforded by the railroad train which averages 56 m.p.h. as compared with the airplane which may average 125 m.p.h. for limited distances.

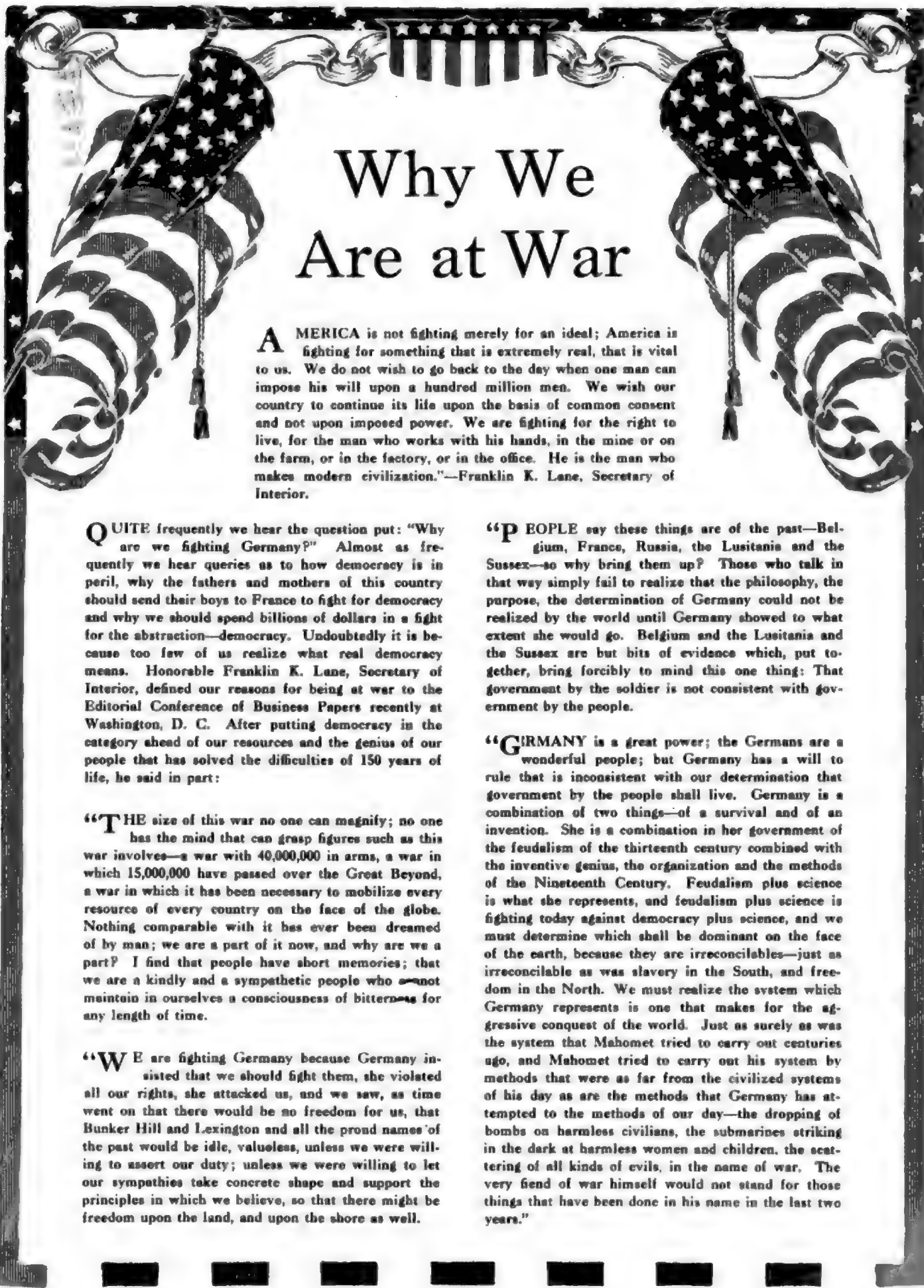
Who Pays the Mud Tax?

THE average cost of hauling farm products over our roads as a whole at the present time is 23 cents per ton per mile. Take such an agricultural state as Kansas, where there is much hauling of wheat and other farm produce. Here the average weight per load last year was 2960 lbs., the average haul 5.5 miles, $4\frac{1}{2}$ hrs. being required for a round trip. The cost for a team, wagon and driver for a 10-hr. day was \$3.50, making the ton-mile cost 21.5 cents. Think what permanent hard roads would mean to a state like Kansas—to any state. The ton-mile cost by rail is $\frac{1}{4}$ cent; by water, $\frac{1}{8}$ cent. Over our average roads the cost of moving 1 ton 1 mile is from twenty-five to fifty times as much as by rail and from 100 to 200 per cent greater than by water.

ROAD draft is figured on the basis of the number of pounds required to pull a ton on the level. The horse, perhaps, is the best basis for working out what the relative difference is as between a poor, sandy road and one that has a permanently-hard surface. A horse exerts a pull in pounds that equals about one-tenth of its weight at walking speed. It can exert a pull of one-half its weight for short distances, but one-fourth is the ordinary maximum for longer periods. Assuming that a vehicle weighs 1500 lbs. and the load 3000 lbs., we have $2\frac{1}{4}$ tons. The pulling energy in pounds that the team would have to exert per ton would be as follows

over the classes of roads given: Loose sand, 280 to 350; gravel with $\frac{3}{4}$ -in. loose top, 300; dry gravel, 258; best gravel, 60 to 100, dirt, 75 to 150; hard dirt, 106; macadam, 40 to 60; asphalt, 30 to 60.

THE drawbar pull of a motor truck is affected by certain conditions such as gearing, speed of the engine, fuel combustion, etc., that are not comparable to that of a team. However, the greatly increased power to pull attained by a motor truck as compared with a team is common knowledge to anyone, so it will follow that the limits of pulling power over different classes of roads would bear the same relation according to the motor vehicle's ability to pull as it would to the team. We have in this country something like 2,500,000 miles of country roads of all classes, BUT ONLY 11 PER CENT OF THEM ARE SURFACED. Can you imagine what an enormous mud tax we pay annually. Some statisticians put it at \$300,000,000 a year. It is a figure that calls for a great amount of study to be accurate, but we do not have to figure much to realize that if dirt or sandy road ton-mile costs are from 20 to 50 cents and the tractive resistance of these roads bears the relation of 350 lbs. to 30 for smooth, hard roads, we are paying an enormous toll as a penalty for our laxity in building the type of roads that have made history in Italy and France; or such patches of roads that have been permanently improved in this country.



Why We Are at War

AMERICA is not fighting merely for an ideal; America is fighting for something that is extremely real, that is vital to us. We do not wish to go back to the day when one man can impose his will upon a hundred million men. We wish our country to continue its life upon the basis of common consent and not upon imposed power. We are fighting for the right to live, for the man who works with his hands, in the mine or on the farm, or in the factory, or in the office. He is the man who makes modern civilization."—Franklin K. Lane, Secretary of Interior.

QUITE frequently we hear the question put: "Why are we fighting Germany?" Almost as frequently we hear queries as to how democracy is in peril, why the fathers and mothers of this country should send their boys to France to fight for democracy and why we should spend billions of dollars in a fight for the abstraction—democracy. Undoubtedly it is because too few of us realize what real democracy means. Honorable Franklin K. Lane, Secretary of Interior, defined our reasons for being at war to the Editorial Conference of Business Papers recently at Washington, D. C. After putting democracy in the category ahead of our resources and the genius of our people that has solved the difficulties of 150 years of life, he said in part:

"**T**HE size of this war no one can magnify; no one has the mind that can grasp figures such as this war involves—a war with 40,000,000 in arms, a war in which 15,000,000 have passed over the Great Beyond, a war in which it has been necessary to mobilize every resource of every country on the face of the globe. Nothing comparable with it has ever been dreamed of by man; we are a part of it now, and why are we a part? I find that people have short memories; that we are a kindly and a sympathetic people who cannot maintain in ourselves a consciousness of bitterness for any length of time.

"**W**E are fighting Germany because Germany insisted that we should fight them, she violated all our rights, she attacked us, and we saw, as time went on that there would be no freedom for us, that Bunker Hill and Lexington and all the proud names of the past would be idle, valueless, unless we were willing to assert our duty; unless we were willing to let our sympathies take concrete shape and support the principles in which we believe, so that there might be freedom upon the land, and upon the shore as well.

"**P**EOPLE say these things are of the past—Belgium, France, Russia, the Lusitania and the Sussex—so why bring them up? Those who talk in that way simply fail to realize that the philosophy, the purpose, the determination of Germany could not be realized by the world until Germany showed to what extent she would go. Belgium and the Lusitania and the Sussex are but bits of evidence which, put together, bring forcibly to mind this one thing: That government by the soldier is not consistent with government by the people.

"**G**ERMANY is a great power; the Germans are a wonderful people; but Germany has a will to rule that is inconsistent with our determination that government by the people shall live. Germany is a combination of two things—of a survival and of an invention. She is a combination in her government of the feudalism of the thirteenth century combined with the inventive genius, the organization and the methods of the Nineteenth Century. Feudalism plus science is what she represents, and feudalism plus science is fighting today against democracy plus science, and we must determine which shall be dominant on the face of the earth, because they are irreconcilables—just as irreconcilable as was slavery in the South, and freedom in the North. We must realize the system which Germany represents is one that makes for the aggressive conquest of the world. Just as surely as was the system that Mahomet tried to carry out centuries ago, and Mahomet tried to carry out his system by methods that were as far from the civilized systems of his day as are the methods that Germany has attempted to the methods of our day—the dropping of bombs on harmless civilians, the submarines striking in the dark at harmless women and children, the scattering of all kinds of evils, in the name of war. The very fiend of war himself would not stand for those things that have been done in his name in the last two years."



sen Peak is the only one actually active within history.

Notwithstanding the war, a larger patronage of the Rocky Mountain National Park is expected this year even than last, when 86,000 visited it and its beautiful valley gateway, Estes Park. The hotels, boarding houses and public camps which then were crowded have all been enlarged. Even with an increase of many times of patronage, there will be no sense of crowding in the park's 400 square miles of valleys and mountains.

During the winter Congress has enlarged the boundaries of the Rocky Mountain National Park by adding more than 40 square miles of area upon the Estes Park side. The Twin Sides and Gem Lake are now in the national park.

PEOPLE TO DECIDE ROADS

Springfield, Ill., June 23—Governor Frank O. Lowden today signed the Meents \$60,000,000 good roads bill submitting the bond issue to the voters. The new law provides a comprehensive system of hard roads, aggregating 4500 miles, that will be built within the next four years if the voters approve it. The system, which has been described in *MOTOR AGE*, reaches practically every one of the 102 county seats of Illinois, connecting them with the more important cities.

The companion bill, which is to pay for the issue, doubling motor vehicle licenses, was signed last week. The principal of the \$60,000,000 will be paid from the license fees. The expectation is that the entire issue will be retired within twenty years.

TO SHOW FORD ACCESSORIES

Chicago, June 22—At a meeting held this week plans were laid for financing the national exposition of Ford accessories, a body of manufacturers that will direct shows throughout the country at which will be exhibited accessories made especially for Ford cars.

H. V. Buelow, Toledo, Ohio, has been made show manager and will have charge of all of the shows, the first of which will be held in Chicago in September, and others in the principal cities of the country on dates not yet determined.

Included in the personnel of officers and directors are men representing companies of national importance, which marks the proposed show as one of more than local importance. It has been found that there are some 300 manufacturers who, it is hoped, will become members of the organization, the membership fee being \$100. This is not an annual fee but, once paid, makes the membership permanent.

An office has been opened by Mr. Buelow in the New Southern Hotel, Chicago, from which details of the show will be worked out. It is proposed that a circular be published and that each member send out his pro rata of a total of 300,000 to Ford owners within a radius of 300 miles of Chicago.

To Dismantle Speedway

July 4 Races at Omaha to Be Last for Present Board Track

Nineteen Drivers Enter for 150- and 50-Mile Events

OMAHA, Neb., June 25—The Omaha speedway, considered one of the fastest board tracks in the country, is to be dismantled after the races here July 4. It was built about three years ago at a cost approximating \$125,000.

Nineteen drivers have been entered for the race, which is an A. A. A. championship award event. Two races, of 150 and of 50 miles respectively will be held, as was the case last year. With the faster machines which are being brought out this year and with the smoothing out of "shoulders" in the track which has been in progress, it is confidently expected that new records for both distances will again be made at Omaha this year, as was the case in the 50-mile event last year. The drivers are arriving and tryouts already have developed speed well above 100 m.p.h.

FOUR AT UNIONTOWN JULY 4

Uniontown, Pa., June 22—Winners of the two big speedway races this summer at Cincinnati and Chicago, Louis Chevrolet and Earl Cooper, respectively, together with Ira Vail and Louis Fountaine, Ralph de Palma's former mechanic, have been matched for a four-cornered race at the Uniontown speedway July 4. The four drivers signed contracts at Chicago for their appearance here to compete for the \$5,000 purse.

Chevrolet was the winner of the first race for the University trophy last November, driving a non-stop race as he did in winning the Cincinnati Sweepstakes on Memorial day. Earl Cooper drove a non-stop race at Chicago last week. In addition the Uniontown program consists of a 112-mile dealers' race and a four-cornered Australian pursuit race among the four fastest cars in that event. De Lloyd Thompson, the aviator, has been engaged to make several flights during the progress of the races.

STOCK CARS TO RACE

Denver, Colo., June 22—A 131-mile road race from Denver, Colo., to Laramie, Wyo., for stock cars only, will be a part of the Fourth of July program here. While special racing machines will be barred, entries will be open to all makes and classes of stock cars, and a big field is expected. The course is a dirt road, with gravel surfacing about half the distance. It skirts the mountains practically all the way, and one stretch near the finish runs through a

canyon in the foothills. Sharp curves and a few rather steep grades call for heady driving and make the course more attractive in respect to thrills promised.

About a dozen towns are directly on the route, and all these and several others nearby offer to help make the race a success. Dragging and other road work will be given special attention by county commissioners and other officials responsible for upkeep, and a good condition of the entire course is looked for.

The race will be conducted by the *Denver Times*, which will have the co-operation of the Denver Motor Club and the Automobile Trades Association of Colorado.

OKLAHOMA RACES OPEN

Oklahoma City, Okla., June 22—The feature opening race was the 10-mile free-for-all, for which \$300 was offered to the three winners. Fred Horey, driving a Briscoe, finished first in the first of the midsummer motor races here. Less than a car's length behind was Sig Hugdahl, driving a Maxwell. Art Klein, driving a Briscoe, finished third.

In the second day's races, Art Klein in a Briscoe, won the stellar honors by out-distancing Craft, Hugdahl and Horey, in the 25-mile free-for-all, for a purse of \$500. He drove the distance in 33 min. 16½ sec.

BARNEY SETS NEW MARK

Milwaukee, Wis., June 25—Barney Oldfield, driving his new Miller "Golden Egg" racer, defeated Ralph de Palma in a special match race run in three heats of 10, 15 and 25 miles, on the one-mile circular dirt track at State Fair Park, near Milwaukee, on Sunday afternoon. More than 8000 people turned out to see the match. It originally was scheduled for Saturday afternoon, but was postponed because of the near-cloudburst of Friday night, when 5.85 in. of rain fell, a new record in Milwaukee weather bureau records. Because of the excellent drainage system, the track was in fair shape by Sunday afternoon, but nevertheless was rather heavy. Oldfield started off the program with an exhibition mile against time in the Miller, being caught at 52½ sec. De Palma then drove 2 miles in his Packard special, his time being announced as 1:45¾. Oldfield won the first match event, at 15 miles, in 13:25, it was announced. The second heat, at 25 miles, also was won by Barney in 22:42. The last heat, a 10-mile event, went to Oldfield in 9:02¾. Fred J. Wagner handled the events as starter.

ROCKWELL HEADS SMITH SALES

Chicago, June 26—Berry Rockwell, formerly with the McAvoy Advertising Agency, in Chicago, has been made general sales manager of the Smith Motor Truck Corp. and has already assumed his new duties.

Standardize to Increase Food

Industry to Make Agricultural Tractors More Simple to Assure Adequate Supply

WASHINGTON, D. C., June 25—Special telegram—Entry of the United States into the world war and the knowledge that the airplane certainly will be one of the deciding factors if not the deciding factor in the success of America and its Allies, makes the standardization of the various parts of the aerial warships, a long step toward which was taken to-day, of particular significance. This was accomplished at the annual midsummer meeting of the Society of Automotive Engineers, at the Bureau of Standards.

No less important from a national standpoint, and, perhaps of even greater importance to the general public, was the work accomplished toward the assurance of adequate food supplies in the work done in the way of making the production of agricultural tractors more simple and rapid and also the assistance that was given the farmers of the country in selecting the proper tractor for their individual needs. To these ends were gathered the designers, engineers, production men and the important forces of the manufacturers of motor cars, trucks, tractors, airplanes and motor boats in Washington under the auspices of the Government and in quarters at the Bureau of Standards assigned them by the Federal Government. That the heads of the nation recognize the value of the work being accomplished by the motor car men and those of the allied industries in the truck, tractor, airplane and motor boat fields was emphasized in an impromptu address of welcome by Secretary Redfield of the Department of Commerce, who spoke very highly of the importance of the work that the Society of Automotive Engineers was doing in solving the manufacturing problems and in assisting in Government war work, both as a society and as individuals.

Standards to Be Considered

The meeting to-day was that of the standards committee of the society and the reports of the divisions of this committee which were accepted to-day will be presented to the society as a whole to-morrow. It is anticipated that the standards which have been accepted by the standards committee will be accepted by the society, after which they will become standards of the industry upon acceptance by a mail vote of the membership.

More than 300 attended the meeting of the standards committee to-day, and 700 are expected at the general meetings to-morrow and the dinner in the evening. To-morrow will see the routine business of the

society in the way of officers' reports, committee reports, etc.

The report of the membership committee is expected to be of particular interest, as it is believed it will show an increase in membership of between 800 and 1000 during the last two months. Among the features of to-morrow's sessions are the following formal papers:

"Building Submarine Chasers by Standardized Methods," by Henry R. Sutphin, illustrated by motion pictures.

"The Farm Tractor as Related to the Food Problem," by H. L. Horning, illustrated by motion pictures.

"Design and Production of Aircraft in War Time," by Wing Commander I. W. Seddon, of the British commission.

"Classes and Uses of Battle Planes," by Lieut. Amaury De La Grange, of the French commission.

"Fundamentals of a Successful Kerosene-burning Tractor Engine," by C. E. Sargent.

"Lessons of the War in Truck Design," by W. O. Thomas.

At an informal dinner at the new Willard Hotel, the engineers are to be addressed by Secretary of War Baker and others close to the great national war movements.

One of the most important matters to-day was the proposal to standardize quite extensively with relation to farm tractors. The proposed standards are entirely fundamental in character.

"They are points," said H. L. Horning, chief engineer and general manager of the Waukesha Motor Co. and member of advisory committee, in the Council of National Defense, "which have been bothering tractor manufacturers for years. If adopted they undoubtedly will determine the future policy of the farm tractor industry."

The tractor standards committee recommends, first, that the rating of tractors be standardized, that there be two ratings, one the drawbar horsepower and the other the belt horsepower. The drawbar rating would be based upon 80 per cent of the actual ability of the tractor operating on good, level footing for 2 hrs. continuously. The belt rating would be 80 per cent of the power which the engine is guaranteed to develop continuously for 2 hrs. In determining these ratings, the committee took into consideration the likelihood of farmers operating tractors up to the limit of their ratings; so that if this limit be

set at only 80 per cent of the ability of the tractor there will be little danger of disastrous overloading.

Another matter that was considered was the proneness of farmers to judge the capability of a tractor by the number of plows it will pull regardless of the speed at which they are pulled. For this reason it is proposed also to standardize tractor speeds at $2\frac{1}{2}$ m.p.h. This speed has been determined to be the best from the plowing point of view from long experimentation. Slower speed prevents proper scouring of the plows and higher speed is scarcely feasible. Furthermore, this speed is exactly suited to existing types of mold-board plows and will not require new designs.

The belt speed also is to be standardized. It has been recommended that belt speed be made to conform to the requirements of the threshing machine. It is to drive these machines that belt power is most extensively used. It has been found that a belt speed of 2600 ft. per minute is best, and this speed is recommended. This can be obtained with a 42-in. pulley running at 240 r.p.m. Two other important tractor matters which it is recommended be standardized are the height of the drawbar from the ground and the method of attaching various farm implements to the tractor. The drawbar height recommended is 17 in. A standard type of coupling would permit the use of any make of farm implement with any tractor, thus simplifying the handling of farm implements from the dealers' point of view as well as from the makers'.

Present Standards Apply

Many existing S. A. E. standards covering such things as nuts and bolts, yoke and rod ends, cotter pins, screw threads, etc., already are applicable to the farm tractor, and other standards, such as those covering magneto mountings and carburetor flanges will be modified in the degrees necessary to fit them to tractors. This means that the motor car or truck dealer eventually will be able to supply the demands of the farm tractor owner from the motor car stocks on his shelves.

The committee is considering the standardization of drive wheel rim punchings. This would permit the interchangeability of various types of lugs used for getting traction in different soils. Thus the scope of the tractor would be increased because it would be possible to use it for different operations with very little change, and that change easily made.

Of equal importance with these tractor standards are the proposals made by the aeronautic division. Here, too, there are many motor car and truck standards which can be adopted without change and this is being done. To-day the committee took up in detail the method of control and recommends that the control be the same for all types and makes of machines. This will simplify the training of aviators in addition to overcoming many manufacturing problems and reducing the stock of spare parts which a dealer must have. Through the labors of this committee production difficulties will be swept away and airplane manufacturers will be assisted in obtaining the quantity production which is vital at the present time.

At the meeting of the standards committee in Cleveland, the electrical equipment division made certain recommendations concerning the size and shape of generator and starting motor flanges and these have now been formally approved by the standards committee. The adoption of these standards will reduce the spare parts stock of the dealer, garageman and supplyman in addition to simplifying maintenance work. Two sizes of both flanges are proposed for every type of generator and starting motor.

May Standardize Voltage

The lighting division, which is closely allied to the electrical equipment division, recommends that a method of headlamp construction be adopted which will do away with all need of focusing; in other words, lamps would leave the factory properly focused, could never get out of focus and hence would never need attention of this kind. The adoption of this standard will reduce the amount of service the dealer must now give in focusing lamps for car owners.

This division also recommends that battery manufacturers standardize the voltages of their batteries as follows: 3-cell, 6.8 volts; 4-cell, 8-10 volts; 6-cell, 12-16 volts, and 9-cell, 18-24 volts. Such action would assist the bulb manufacturers in turning out bulbs of the highest possible efficiency for the voltage. This would also tend to reduce the number of lamp sizes the dealer must stock.

The starting battery division, also allied to the electrical equipment division, actively engaged in a campaign to get manufacturers, among other things, to eliminate all loose parts about a battery—parts which can be lost in the service station or garage. These are principally the terminals. Two sizes, one for the negative and the other for the positive post, are recommended. They are different in size so the garageman cannot possibly through error or carelessness get the wires twisted.

The dimensions of the batteries themselves having been previously standardized, this committee now recommends that a standard size of battery compartment be

adopted. This would be both ventilated and drained. It has not been decided just where this would be located, however.

Another very important matter which the engine division recommends is the adoption of standard sizes for all poppet valves. At present there is an immense number of sizes varying only by fractions of an inch. In consequence, and except in exceptionally few cases, the valves for one engine will not fit any other engine of the same dimensions. If the recommendations of the committee are adopted, there will be just sixteen sizes of valves for every type of engine—farm truck, tractor and motor boat. The largest is 1-in. and from that the sizes increase in diameter by $\frac{1}{16}$ -in. increments. Furthermore, this standard valve will have a standard slot in it for the valve grinding tool, thus simplifying again the work of the garageman and repairman.

The miscellaneous division, which has the work of standardizing a lot of small parts, has extended the standards covering rod and yoke ends to include two larger sizes, namely, $\frac{5}{8}$ -in. and $\frac{3}{4}$ -in. These conform closely to present standards on smaller sizes.

Army-Type Truck Jan. 1

New Standards to Make All Parts Interchangeable and Benefit the Small Maker

WASHINGTON, D. C., June 26—Special telegram—Through a conference of officials of the War Department, makers of truck parts and the Standards Committee of the S. A. E. specifications for military motor trucks will be far more accurate and detailed than the original draft published recently. By Jan. 1 there will be coming from factories for the Army trucks whose units will be interchangeable with those of all other American Army trucks. Engines, transmissions, axles, springs, radiators and even frames will be so closely similar in external dimensions that one will be replaceable by another. This will not hamper originality of design as regards the inner details in the engine. For example, there will be standard location of the bearings, a standard transmission coupling, a standard place and size for each water pipe attachment, etc. For manufacturers who assemble chassis any source of parts supply can be used. If one transmission maker fails to live up to his promises another can supply a gearset which will fit perfectly. The War Department's object in encouraging this standardization is two-fold. The army cannot use fleets of vehicles composed of all sorts of designs without great difficulty. The more the army has of absolutely one design, the better, provided that design is right.

There are several commercial trucks good enough for use, but none that could

not be made still better for military work. Thus the plan of the board is to use the existing machines for first supply and to have later supplies of exactly what they would prefer to get in course of making while the first orders are being delivered immediately. Anything but regular commercial products can be obtained in quantity from only a few manufacturers. On emergency, such as the present, it is only practicable to give orders to makers who can supply rapidly sufficient machines to enable convoys to be composed of one design trucks. This means not less than 1000 of each. To broaden the source of supply it is essential that the smaller makers be enabled to produce trucks so nearly alike that they can be grouped in quantities of 1000, or over, with the same facility that the one-design trucks from larger makers can be grouped.

With the parts makers all in line so that their engines, axles, etc., will interchange, it makes no difference what the capacity of the assembler's plant is. If he can only turn out a couple of chassis a week his output is still worthy of consideration because each of his trucks can be grouped with others from similar small sources of supply and still have the whole fleet possessed of requisite interchangeability. The scheme provides the government with the largest possible market to draw upon. The industry gains in that nobody is too large or too small to be outside consideration.

PIERCE BUILDS ARMY TRUCK

Buffalo, N. Y., June 25—Special telegram—The Pierce army truck, built to conform exactly with the War Department specifications, is being assembled in the Pierce-Arrow plant; the engine being now on the block, it is hoped to have the truck on the road by the end of the week. John Younger, chief engineer of the truck department, states that the specification has worked out extremely well and that he considers the truck to be nearly perfect for military work though, of course, too powerful for its size for commercial purposes. It is understood that the Pierce company does not plan to build this truck for other than military work, but that it is prepared to produce any quantity that the Government may call for.

RED CROSS GIFTS

Flint, Mich., June 22—The General Motors Co. yesterday voted \$10 to the Red Cross fund for every employee, which amounts to some \$250,000. The Buick and Weston-Mott companies here will subscribe \$125,000. The Cadillac and Northway companies of Detroit will subscribe \$75,000; the Oakland and General Motors Truck companies of Pontiac, \$25,000; the Olds company of Lansing, \$15,000, and the Jackson-Church-Wilcox company of Saginaw, \$10,000.

The Ford Motor Co. has given 1,000 Ford ambulances, valued at \$500,000.

Designing Farm Tractors

The Kind of Machine That Should Be Built

This is the first of a series of articles dealing with the problems to be overcome in producing the vast quantity of tractors essential for increasing the world's food supply.—Ed.

THE tractor industry is no flash in the pan; it is as real, as lasting, and as important as the motor industry; perhaps more solid, even. It is not a business to go into with the idea of big, quick profits and hang the rest. It is a business to enter with the idea of building up a great firm.

Taking the manufacturers who today do make or could make tractors, and there are hundreds of them, a dip into the future, ten years hence say, would show twenty of those firms as the leading tractor manufacturers of the world. Among that twenty would be some who are making tractors today, June, 1917; but the possession of a big tractor output this year is no assurance that the maker will not be in some other line of business in three years' time. The man who can have the highest hopes for the future is he who is making the tractor which gives the least trouble and continues to do good work.

No Price Limit

The question is often asked "Is there not a price limit for a popular machine?" The answer is quite definitely "No." There may be an idea at the present that \$1,000 is a goal to strive for in designing a three-plow machine; that other sizes ought to fall between specific limits of price; but it is impossible to uphold this view in argument. Of course, the farmer will buy as cheaply as he can, but he will no more buy the lowest price tractor than he will buy the lowest price motor car or anything else.

Let us not forget that tractor service is the hardest of all, that a truck has an easy life by comparison, and we instantly see that good workmanship in the engine and transmission is absolutely essential. Poor workmanship means disaster and the cheapest tractor is likely to be the most expensive over a period of, say, a year's work. The big chance in this industry now is for good tractors. If they are made good in the first instance they can be cheapened later, in proper manufacturing sequence, but in this day every tractor builder is but digging the foundation for the house of his reputation. The man who takes chances with the foundation is likely to find cracks in the building after it has stood a while.

Just to cite a single example of the sort of harm too great a care for cost can do. In the open market there can be bought very cheaply cooling fans and pulleys for them. There is no stock equipment of this sort, made for motor trucks, of course, that is big enough for tractor work. To use the

stock articles dooms the farmer to perpetual belt trouble, means that the water will boil, the engine run hot and eventually damage itself thereby. The dollar or two extra for properly massive fans and fan drives will be earned back by the machine in the first few weeks.

Remember that a small manufacturer does not buy the cheapest machine tools he can get. If his ability to buy new tools is limited he is more likely to buy a good one while he is about it, knowing that it will last long and work economically. The business of the tractor industry is to show that the tractor which does the best work and keeps on doing it the longest is the best proposition.

And the tractor need not be so very expensive at that. The engine is the main essential; the transmission next. After these the frame, wheels, etc., can be of cheap material and rough construction. There is no finish to think about. A good coat of paint protects from rust.

Avoid Foolish Restrictions

What we want to avoid is foolish price "ideals." Suppose a three-plow machine, with the proper workmanship and good design, can be sold for \$1,200 or \$1,500, or any other similar figure; then it is not wise to "trim" it so as to allow it to be marketed a couple of hundred dollars cheaper. It may be argued that the farmer does not know the difference between cast and cut gearing. Perhaps he does not now; BUT HE WILL.

The fascination which tractor design is exercising upon the minds of motor car engineers is a little unexpected. The tractor did not immediately grip the imagination in the way that the airplane did, yet slowly and surely our engineers are finding themselves in the act of thinking out how they would build a tractor.

There is something much deeper in this than the mere business opportunity. Just as almost every motor car engineer worth his salt has pined to design a racing car, so are they pining today to build a tractor.

Now the building of a tractor is both easy and difficult. Compared with the task of producing a good motor car ten years ago it is child's play to build a tractor which will have the requisite power and be reasonably efficient, but there are very little data available to enable us to judge whether the machine which seems to be doing so well is really the sort of thing it ought to be.

For example, we do not yet know what

the speed should be. With plows as now made it is generally thought that from 2 to 2½ m.p.h. is the best speed, but plows have been built to suit horses for centuries, and it may easily be discovered that greatest economy results from plowing at three times the speed with a different sort of plow. The milling machine has ousted the planer for many classes of work. The planing machine was a development from the cold chisel, the milling machine was something new that came after we were accustomed to the idea that mechanical power would be used for machining metal.

The design of agricultural machines is a fairly modern art, but the implement maker has always had to assume horse traction for the field machines; now that he no longer has this limitation to face it is possible, and even probable, that we shall see new plows and other implements which will not be used just as the horse-drawn ones were used. This will react upon the tractor, altering in some ways its specification, so it is fairly safe to predict that it will be ten years before tractor engineering has reached a stage of development comparable with that of the motor car today.

The Type the Trouble

Thus the engineer's difficulty is more to decide what sort of a machine he wants to make than actually to make it. When the broad outline is settled the "inking in" is not so hard. Here it is that motor car experience comes to our assistance. There are problems for the tractor engine designer, but he can be sure of laying out an engine which will be fairly satisfactory. With the transmission, it may turn out rather inefficient, but we know so much about designing gearsets that mechanical mistakes are improbable to the last degree. To sum up, we can design and make without much difficulty any single unit of a tractor, relying mainly upon motor car experience. What we cannot yet do is to be sure the choice of the sort of units and their method of arrangement are correct.

Take one especial feature, that of turning. A four-wheel tractor needs a fair width in which to reverse its direction, which means that the land is plowed by the ordinary process only in the center of the field. Of course this covers the bulk of the surface, but there is a wide strip left which has to be plowed in a different direction. It is not difficult to plow the last parts, but to what extent it pays to alter the design of the tractor to reduce its turning circle we have got to find out by ex-

perience. Some machines will turn literally in their own length; others require a "land" at each end of the furrow of 40 ft. or more. To get the short turn and so cut down the "land" means at present some complication in the transmission; engineers have got to find out whether it is worth while or whether we can get a short turn machine without any offsetting drawback.

Probably the first thing upon which some semblance of agreement will be reached is with respect to size and power. In trucks we have 1-ton, 1½-ton, 2-ton, 3-ton and 5-ton as the standard list of capacities. There are larger trucks, but the three smallest are the most used. In tractors we have no such convenient rating for laying down a list of types. Sometimes horsepower is mentioned; more often a machine is classified by the number of plows it will pull in "normal" circumstances, and thus we get two-plow tractors, three-plow tractors, and so on. Unfortunately this means very little either to engineer or farmer, because the nature of the earth and of the plow, together with the speed of operation, are factors just as important as the mere number of plows.

Power Trust Index

From an engineering viewpoint the drawbar and the speed will probably come to be the most used factors—that is, the drawbar horsepower. This is not likely to be accepted readily by the farmer as a means of rating for some time to come. His question is "What work will it do?" and we have got to find some way of telling him in terms which he can appreciate.

It might be possible for the tractor division of the S. A. E. standards committee to set up some definitions which would translate drawbar horsepower into number of plows. If agreement could be reached as to the speed at which rating should be made, say 2 m.p.h., and also as to the drawbar required per plow, say 1,000 lb., under normal conditions, we could then rate a tractor in terms of number of bottoms, once the drawbar at the standard speed was known. The writer believes that it will not take very long before the farmer discovers the meaning of horsepower with respect to the ability of a tractor, so that if he knows a machine will deliver so many horsepower continuously he will immediately know what it will do with plows and with all the other mechanisms that a tractor has to operate.

The case is not on all fours with that of the truck. Power in a truck is no index to its carrying capacity, but power is a direct index of a tractor's usefulness either for towing implements or for driving stationary machines. For a threshing machine, for example, the engine power required at the belt is a very definite thing, and a farmer who wants to use his tractor for driving a particular thresher already knows that the tractor engine must have at least so many belt horsepower.

The question of driving threshers and

similar machines may have a profound effect in settling the range of sizes in which tractors will be built. Apparently a tractor with less than 25 to 30 brake-horsepower is considerably limited in this respect—that is, brake-horsepower at the belt pulley. On conventional reckoning a trifle less than 10 hp. in the engine is necessary adequately to handle one plow bottom, allowing for the losses in transmission, which are variously reckoned from 30 to 50 per cent. This means that a tractor big enough to drive a fair-sized thresher is capable of pulling three or perhaps four plows in most sorts of earth. Machines with 20 brake-horsepower or a little less, commonly called two-plow outfits, can only drive a thresher of uneconomically small size.

Probably the small farmer will be content with a tractor which is big enough for most of his work, leaving out such jobs as threshing. On some farms it may easily pay better to have several small tractors with the handicap of having to get outside assistance for the heavy stationary jobs than to have one large machine; because the large tractor cannot be used to best advantage in the field unless the areas to be tilled are individually large. Also it must not be forgotten that as long as he depends on horses the farmer is safe to have most of them in good condition at any time; if one falls sick it does not stop his work. Much farm work must be done at the opportune moment. A factory loses a week's earnings if it is forced to shut down for six days; a farmer may lose many months' of earnings by being unable to work as he should for two or three particular days. Thus it is not very safe for a farmer to rely upon just one tractor. Suppose he wants capacity for pulling six plows at once. One big machine will do this and will also drive a substantial

thresher. Two smaller tractors will do the same plowing but will not drive the thresher. Yet with two tractors a breakdown would only slow work and would not stop it. In times of great stress the half-size machine might be made to plow day and night, so offsetting the absence of the second.

In something the same way one sees in the truck field very often that it is better to use three 2-ton trucks than one 6-ton, although the latter might be more economical provided it could be relied upon to operate continuously without trouble; but a breakdown in transportation seldom is vitally important in the way a delay is vital to the farmer.

The very light tractor, which can at the best only pull one plow bottom, will certainly sell in large quantities, but it will do so in much the same way as a Ford delivery sells. That is to say the small farmer can make economical use of a minimum size tractor just as a small tradesman can economically employ a light passenger car chassis. In both cases first cost is highly important because the man cannot raise more than a certain amount of money. In both cases the desire is to get the best improvement upon the horse that the capital available will supply.

Three Sizes Suit Most Cases

Just as no large business would ever handle its transportation with a huge fleet of the cheapest possible vehicles, so no farmer would ever use a smaller tractor than he could afford to buy—that is, up to a three or four-plow size. For one thing, the cost of labor is highly important. Two men can handle a very large tractor and do a vast deal more work with it than could four men each with a one-man, one-plow machine.

So much for generalities. If we assume that agreement can be reached upon the proper brake-horsepower per plow bottom one thing is clear, and this is that tractors are more likely to be built in multiples of this amount of power than in any other way. Suppose the power per bottom is 5 hp. at the drawbar, the natural sizes in terms of drawbar horsepower would be 10 hp., 15 hp., and so on. Do we need such close steps as this and how far up the scale do we go to reach the limit? Just at present the prevailing opinion in the tractor factories appears to be that the bulk of the machines called for will be made in three sizes, 10 hp., 15 hp. and 20 hp. at the drawbar, at a speed of between 2 and 2½ m.p.h. These are otherwise called two, three and four-plow outfits. In this range it seems to be low first cost which is the main factor in the demand for the smallest size, and a good many men in the industry incline to the opinion that for all-round usefulness the 20 drawbar-horsepower machine is the best, better for most work than anything larger and yet big enough to operate economically on almost all the work a medium sized farm has to undertake.

PARCELS POST AS STRIKEBREAKER

Pittsburgh, Pa., June 22—Keen interest is being manifested in the plan successfully tried out in the last several months at Pittsburgh of combining the delivery services of different retail dry good stores in each of the larger cities of the country through the medium of Uncle Sam's motor delivery service. As originated at Pittsburgh, a large department store there faced with the strike of the union motor delivery car drivers called upon Postmaster Guffey to ascertain whether he could handle several thousand parcels post packages in an emergency.

Mr. Guffey said that the government had no interest either way in a strike, but that if the packages were placed in the branch postoffice at the store they would be delivered. This was done and the deliveries made without any attempt at interference with the government truck drivers. Now the National Retail Dry Goods Association plans to adopt this method as a measure of war-time economy.



What \$600,000,000 for Airplanes Means

Contemplated Appropriation Might Bring Control of Air and Finally Victory

WASHINGTON, D. C., June 18—The contemplated appropriation of \$600,000,000 for aviation to build various kinds of war planes, to train aviators and mechanics, and perform everything else in connection with the work, is a staggering problem that confronts the motor industry. We mention it as confronting the motor car industry because practically all of this work will have to be cared for by the industry. The aviation industry is capable of caring for but the smallest fraction of it and the motor car industry is the only other one qualified to handle this work. This huge total thrust upon an industry in its swaddling garments is scarcely comprehensible. To gain a conception of its meaning we might think of a similar appropriation having been made for the manufacture of motor cars 15 years ago. It is impossible to comprehend just what this means to the aviation industry in America and as there is scarcely an aviation industry to care for it the conception of what it means to the motor car industry is equally great.

Drive Germans from Air

The appropriation of \$600,000,000 for aviation means that the Allies are going to make a strong bid to win the war by control of the air, to send enough airplanes, aviators, mechanics, and other necessities to France literally to drive the Germans out of the air on the Western front. Driving them out of the air would be a wonderful accomplishment. It would be equivalent to taking the eye out of the German army. Without their airplanes the Germans could not direct their artillery fire which would be very much reduced in effectiveness. Without the airplanes the Germans could not detect the massing of Allied forces for attacks. With the Germans out of the air the Allies could maneuver their forces for line-turning and other maneuvers which are now rendered impossible by the German airplanes. Once the Germans are driven out of the air it will be possible with a great number of Allied planes to make bombing attacks on German quarters and concentration points and factories, a hundred or more miles back of the lines. It is because of these many possibilities apparently that the War Department at Washington, directed by the Advisory Commission of the Council of National Defense, has drafted such a bold aerial program. Howard E. Coffin and E. A. Deeds are naturally the leaders in the Council of National Defense in this movement.

The possibilities of aerial work are shown by the great variety of airplanes necessary in the work. At present the

Allies have a tremendous number of airplanes performing eight or ten different kinds of work over the Western front every day. These planes in their different organizations carry on their work for perhaps 15 to 18 hrs. each day, irrespective of weather or other conditions. Their organization is as complete as that of an army of infantry, a squadron of cavalry, or a corps of artillery. No longer is there any question of airplane work. The airplane is working as hard in the storm as in the sunshine. It is no longer a fine-weather weapon.

The airplane service is divided into a few divisions as follows: There are planes that go in bombing squadrons, namely to drop bombs on headquarters back of the lines. Such planes have to fly relatively low and are not of the speediest type. Other planes are used entirely by photographers who fly relatively low and are working many hours a day. There are others who do nothing but co-operate with the heavy artillery signaling to them if their fire is accurate and correcting ranges, etc.

Practically all of these three types of planes for bombing, photographing, and directing artillery fire, are not capable of defending themselves from hostile attack and there are two other types of planes whose sole duty is to fight. They are fighting machines. One type is known as the heavy fighting craft which sails at several thousand feet above the planes it is protecting, and the other craft is the high-speed light fighters that might be described as scout machines. These have enormous speeds running as high, it is said, as 120 m.p.h., which is faster than the heavy fighters and much faster than the artillery machines, etc.

In addition there are other duties for airplanes: Some are used for long distance reconnaissance work and fly 20 or 30 miles over the line. There are other machines which do reconnaissance work over the lines only, noting any changes made from day to day.

There are still other machines which accompany the infantry when making attacks and are able to serve as connecting links between the attacking infantry and the headquarter's staff directing the attack.

With these representing a few of the many possible activities for airplanes at the front, it is possible to see how \$600,000,000 will be required for a great program such as planned. To take care of such a program and build such a variety of machines will be no light tax on the motor car industry. The manufacture of engines alone is a big problem to undertake. The manufacture of the planes is also great.

It must be remembered in training aviators there is great destruction. Reports have reached this side that over thirty aviators-in-training are killed per day in England. Should this be the case it means a heavy destruction of machines in this work alone. It has been suggested that America should plan to build 100,000 airplanes. What this means is difficult to grasp. The manufacture of an airplane engine is an immeasurably harder task than manufacturing a motor car engine, in fact, in these days the manufacture of the motor car engine looks like mere play as compared with manufacturing engines for motor trucks, farm tractors, and airplanes. The airplane engine might be described as 100 per cent engine. From the instant it leaves the ground until it returns it is wide open working at its maximum power.

Works at Full Power

The farm tractor engine has been described as a 90 per cent engine because it is under load the majority of its time. The motor truck engine might be spoken of as a 40 per cent one, and the motor car engine as a 15 per cent powerplant, in that it is rarely if ever working at full power, such as the airplane engine is.

Because of this greater load on the airplane engine, its manufacture is much more difficult. One engineer has stated that building 100,000 airplane engines would be much more than building 1,500,000 motor car engines. We cannot vouch for these or any similar figures, but the problem of building airplane engines is much greater than that of building motor car engines.

Already active steps are being taken to meet the higher requirements of making airplane engines. Over 100 mechanics have been sent to the airplane factories of Europe to familiarize themselves with the greater care of manufacture. Howard Marmion is at present heading an organization to study the problem in Europe. Other steps are being taken and the industry is setting out in a business way to absorb this new art.

The life of an airplane engine in service on the front is variously stated to approximate 50 hrs., perhaps 75. After that amount of service the engine is removed from the plane, taken apart and rebuilt as necessary. It is reported that in normal service on the Western front that an airplane engine is given approximately 2 hrs.' service each day. One aviator may have five different planes, all of which he may use on the same day. For each aviator there are approximately five mechanics who keep the different engines and planes in commission. It is very rarely

that a plane returns to the ground without having some parts of its wings damaged by shell or other fire.

The short life of an airplane engine as compared with a motor truck engine or a farm tractor engine makes this aviation business immeasurably greater than at first appreciated.

For the present unquestionably the United States will aim at building only machines used for training aviators and not those engaged in actual fighting on the front. If America can build all of the training planes necessary for the training schools of France and England, as well as America, it will leave the French and English airplane factories free to devote all their energies to manufacturing engines and planes for battle use. As time passes naturally America will work into the manufacture of engines and planes for battle work.

The plans are at present to have 3000 or 4000 planes built in America by the coming spring. It may be possible greatly to increase this number, but the production of airplane engines and planes must not be thought of in the same way as motor car production has in the last 2 years. It is expected that America may eventually furnish 30,000 or 40,000 planes for the western front. Some enthusiasts hope that 100,000 planes may be furnished but they have no conception of what furnishing this number means, when the status of airplane engineering in America is duly considered.

Value of Airplanes

It would seem a wise decision on the part of the War Department to plan such tremendous aviation activity. First, the great value of airplanes on the western front would warrant this; second, the shipping facilities of today make such a program highly desirable. It has been suggested that one aviator at the present time is as valuable as a thousand men on the western front. This is a relative statement and not to be applied under every circumstance of attack or drive. With our shipping facilities greatly reduced by submarine attacks, it is good business to ship airplane engines and the knocked-down planes, together with aviators, as compared with requiring a great amount of shipping space for infantry, cavalry, etc.

The \$600,000,000 appropriation for aviation means many other things to the motor car industry. If eventually we furnish 30,000 airplanes to Europe this will require 150,000 mechanics. We cannot spare these from the factories but they must come from the repair shops and the garages throughout the country. This number, if required at once, would mean approximately five from each garage in the country. Such a draft at one time would entirely destroy the motor car and truck maintenance of the country. Fortunately these will be taken in small drafts and at different times so that repair shops and garages will be better prepared to meet the situation.

Make Cars Over Border

Many Makers Establish Branches in Canada to Avoid Custom Taxes

Practice Enables Factories to Sell Cars at American Prices

DETROIT, June 15—The establishment of branch motor car factories in Canada, a common move during the last twelve months, is regarded in many quarters as a wise procedure and as, according to one large maker, very good business at this time. The majority of those concerns who have built Canadian branches has been actuated by the desire to escape duty taxes. Erection and maintenance of a branch factory in Canada, where considerable assembly and some manufacturing is done, is a means of eliminating and avoiding the usual custom taxes, and allows the maker to sell his product in Canada at the same price as in the United States.

To Save Customs

Another stimulant to the Canadian branch building activities has been the possibility of a preferential customs tax arranged between Canada and the various English allies after the war, which many makers foresaw and sought to avoid with their Canadian branches. They feared a discrimination against the United States which would close foreign fields to American made cars.

This, however, now is regarded by the majority of manufacturers as a past possibility, one that might have occurred if the United States had not entered the war, but which surely will not happen since we joined the allies. But there are still some who believe that the possibility of a discriminating preferential customs tax still remains, and these men state that it is good business to erect a Canadian factory branch because it not only exempts the products of that factory from the customs but also places the American maker in a position of safety if Canada receives the benefit of a preferential customs after the war.

All the companies operating Canadian branches do both assembly and manufacturing and have installed machinery capable of turning out complete products. The various motor car makers are manufacturing cars exactly like those made in the United States factories and sell them at the regular U. S. prices.

There is a labor shortage in Canada at present, caused by the war conditions, and many of the plants have installed women workers, who are surprising their employers by the efficient work performed both in offices and machine shops. Many of the American makers have exported American workers to the Canadian branches to complete their working organizations.

Among the motor car and parts makers

who have erected or are erecting Canadian plants are the Ford Motor Co., Ford, Ont.; Willys-Overland Co., West Toronto; Maxwell Motor Co., Windsor, Ont.; Studebaker Corp., Windsor, Ont.; Chevrolet Motor Co., Oshawa, Ont.; Crow Motor Co., London, Ont.; Chalmers Motor Co., Walkerville, Ont.; Saxon Motor Co., Windsor, Ont.; Dodge Bros., Windsor, Ont.; Harronn Motors Corp., Windsor, Ont.; Signal Motor Truck Co., Toronto, Ont.; Fisher Body Corp., Walkerville, Ont.; Champion Spark Plug Co., Windsor, Ont.; Detroit Weather Proof Body Co., Toronto; Kelsey Wheel Co., Toronto; S. K. F. Ball Bearing Co., Toronto; Goodyear Tire & Rubber Co., East Toronto; Marathon Tire & Rubber Co., St. Catharines, Ont.; Acme Tire & Rubber Co., Toronto.

TO EXTEND POSTOFFICE MOTORS

Washington, D. C., June 22—The Post-office Department, in connection with what is already an established policy, the use of motor vehicles in the postal service, is now ready to extend the use of motor machines to the star route service. This service is one which has to do with the carrying of mail in closed pouches from one postoffice to another or from an office on the railroad to one not located on the railroad. Heretofore motor machines have been used only in cities and in the rural service which carries mail to individual patrons. Beginning July 1 hundreds of motor vehicles will be put on Star routes.

TEXAS GOVERNS TRAFFIC

Dallas, Tex., June 22—With the State Highway law which goes into effect July 1, Texas has a new law governing traffic on country roads taking effect at the same time. It also has new laws relating to chauffeurs' licenses, compelling garages, repair and paint shops to keep in a well bound book registration of all repairs, giving the number of the license on the car, the number of the engine, the character of work done, when and how.

One law provides that when a person is fined three times in succession for the violation of the same part of the laws the license shall be revoked and the convicted will not be permitted to again operate cars or other motor vehicles on the highways of the state.

In the same act it is made a misdemeanor for any one to step upon the running board or interfere in any way with a car not his property, when such motor vehicle owner objects. It makes the taking or driving of another's car a felony, punishable by imprisonment in the state penitentiary. It is an aggravated assault for a driver of a motor car to cause a collision with another and injury to any one, punishable by fine or by both fine and imprisonment. In another act is provided license fees for chauffeurs. This fee is \$3 and chauffeurs must wear badges where they may be clearly seen.

German Airplane Motors Described

Study of Aerial Prizes Show How Foreign Types Differ—Sunbeam and Curtiss

OUR immediate concern is not with either the past or future of aerial travel for sport or pleasure but with the grim business of building planes and motors for war and that there is a very real task ahead of us to develop satisfactory aviation motors must be apparent to anyone who has reviewed, in even a casual way, the results of the last three or four years.

The size of the planes and the speed has increased by leaps and bounds during the period of the war. The facility with which man now flies is almost equal to that of birds. The largest sized successful aeroplane motor built up to 1909 was the 100 hp. Antoinette. This year planes have been flown with a total of 1,700 hp.

It was my good fortune to secure from the Baron Charles Huard two of the aviation motors which were shot down in France during the last year. These motors I have had dismantled and am now able to give the full particulars of 170 hp. Benz and another motor of the Mercedes type which is a twin six and which was probably built by Renault.

Mercedes Motor

The 150 hp. six-cylinder Mercedes motor is 140 millimeters bore and 160 millimeters stroke. This type of motor won all the important places in the Kaiser prize contest with the exception of the first prize, which went to the Benz. The Mercedes company started with smaller-sized cylinders, namely 100 millimeters bore and 140 millimeters stroke, six cylinders. The principal features of the design are forged steel cylinders with forged steel elbows for gas passages, pressed steel water jackets, which when welded together forms the cylinder assembly, the use of inclined overhead valves operated by means of an overhead camshaft through rocker arms which multiply with the motion of the cam. By the use of steel cylinders, not only is the weight greatly reduced, but certain freedom from distortion through unequal sections, leaks and cranks are entirely avoided. The construction is necessarily very expensive. It is certainly a sound job. In the details of this construction there are a number of important things, such as finished gas passages, water-cooled valve guides and a very small mass of metal which is water-cooled surrounding the spark plug. Of course, it is necessary to use very high compression in aviation motors in order to secure high power and economy and owing to the fact that aviation motors are worked at nearly their maximum, the heat flow through the cylinder, piston, and valves is many times higher than that encountered in automobile motors. It has been found necessary to develop special types of pistons to carry the heat from the center of the head in order to prevent pre-ignition.

In the Mercedes motor the pistons have a drop forged steel head which includes the piston boss and this head is screwed in to a cast iron skirt which has been machined inside to secure uniform wall thickness.

By E. H. Sherbondy

In a paper on "Aviation Motors with Particular Reference to Benz and Mercedes Type," presented at the regular monthly meeting of the Cleveland Section of the Society of Automobile Engineers, June 15, 1917.

The carburetor used on this 150-hp. Mercedes motor is precisely of the same type used on the Twin Six motor which I shall hereafter describe. It has two venturi throats in the center of which is placed the gasoline spray nozzle of conventional type fixed size orifices, immediately above which are placed two panel type throttles with side outlets. An idling or primary nozzle is arranged to discharge above the top of the venturi throat. The carburetor body is of cast aluminum and is water jacketed. It is bolted directly to air passage passing through the top and bottom half of the crank case which passes down through the oil reservoir. The air before reaching the carburetor proper to some extent has cooled the oil in the crank chamber and has itself been heated to assist in the vaporization. The inlet pipes themselves are copper. All the passages between the venturi throat and the inlet valve have been carefully finished and polished. The only abnormal thing in the design of this motor is the short connecting rod which is considerably less than twice the stroke and would be considered very bad practice in motor car engines. A short connecting rod, however, possesses two very real virtues in that it cuts down height of the motor and the piston passes over the bottom dead center much more slowly than with a long rod.

Other features of the design are a very stiff crankcase, both halves of which are bolted together by means of long through bolts, the crankshaft main bearings are seated in the lower half of the case instead of in the usual caps and no provision is made for taking up the main bearings. The Mercedes company uses a plunger type of pump having mechanically operated piston valves and it is driven by means of worm gearing.

Overhead Camshaft

The overhead camshaft construction is extremely light. The camshaft is mounted in a nearly cylindrical cast bronze case and is driven by means of bevel gears from the crankshaft. The vertical bevel gear shaft through which the drive is taken from the crankshaft to the camshaft operates at one and one-half times the crankshaft speeds and the reduction to the half-time camshaft is secured through a pair of bevels. On this vertical shaft there is mounted the water pump and a bevel gear for driving two magnets. The water pump mounted on this shaft tends to steady the drive and avoid vibration in the gearing.

The cylinder sizes of six-cylinder aviation motors which have been built by Mercedes are

Bore	Stroke	Horsepower
105	140	100
120	140	135
140	150	150
140	160	170

The largest of these motors has recently had its horsepower increased to 175 at 1450 r.p.m. This general design of motor has been the foundation for a great many other aviation motor designs, some of which have proved very successful but none of which are equal to the original. Among the motors which follow more or less closely the scheme of design and arrangement are the Hall-Scott, the Wisconsin motor, the Renault, the Packard, the Christofferson and the Rolls-Royce. Each of these motors show considerable variation in detail. The Rolls-Royce and Renault are the only ones who have used the steel cylinder with the steel jacket. The Wisconsin motor uses an aluminum cylinder with a hardened steel liner and cast-iron valve seats. The Christofferson has somewhat similar design to the Wisconsin with the exception that the valve seats are threaded into the aluminum jacket and the cylinder head has a blank end which is secured to the aluminum casting by means of the valve seat pieces. The Rolls-Royce motors show small differences in details of design in cylinder head and camshaft housing from the Mercedes on which it has taken out patents, not only abroad but in this country.

Renault Motors

The first important peculiarity of the V-type twin six Renault motor of 135 millimeters bore and 160 millimeters stroke is a small angle between the cylinders which is only 47½ deg. and enables the fuselage to be considerably narrowed in width, thus reducing the head resistance. The cylinders of this motor are almost a duplicate of the Mercedes design of steel cylinder with the exception that the elbows in which the valves are inserted are not so carefully designed and the water jacket is carried around only one side of the exhaust valve stem, whereas in the Mercedes motor the water jacket completely surrounds the exhaust valve stem. It appears to be absolutely essential to cool the exhaust valve as much as possible since pre-ignition is likely to occur always from one of three sources, the spark plug which is the arch offender, the exhaust valve, or the center of the piston head. There are two valves for each cylinder only 66 millimeters or about 2½ in. in diameter. The valve port is 61 millimeters or 2½ in. The inlet to the elbow is 53 millimeters in diameter. The valve stems are both 11 millimeters or ⅞ in. in diameter, with a head approximately 1 in. thick and a 45 deg. angle seat ¼ in. wide.

It is important in aviation motors to have considerable width of seat as it greatly assists in carrying the heat off the exhaust valve. The end of the valve stem is threaded to carry the spring cup and lock nut. Each of the cylinder bands together with the head are machined from a forged bar after which the intake and exhaust elbows are welded on and finally the pair of cylinders are incased in a jacket which is welded on and finally the pair of cylinders are encased in a jacket which is welded up from three pieces of steel approximately ¼ in. thick. The cylinder walls themselves are 3 millimeters or ⅜ in. thick. A standard two-bolt flange is used for all intake and exhaust port connections and has been pro-

fled milled out of steel. The flanges are screwed on to the cylinders and welded and brazed on to the intake and exhaust pipes.

The pistons are of cast iron and are the only very heavily designed pieces in the motor and it certainly seems as though these could have been considerably lightened. The piston carries three concentric rings which are pinned at the ring gap and have a deep annular rib between the bosses. The pistons are also unusually short, only 95 millimeters in length. Piston pin is 38 millimeters in diameter and has a $\frac{1}{4}$ in. wall and is locked with a single set screw and cotter pin. There are eighteen $\frac{1}{16}$ in. holes drilled into the skirt, but these holes must have been drilled for oiling purposes, as they do not materially reduce the weight of the pistons, which is 1975 grams.

The connecting rods are of the articulated type and the short rod is alternately arranged from right to left cylinder from the front of the motor to the back.

The connecting rods are made of B. N. D. steel I-beam section with a flange and web of 2 millimeters thickness. The flanges are 26 millimeters and the web is 34 millimeters wide. In the short connecting rod both ends of the rod are alike. The length of the rod is 300 millimeters or 11 $\frac{1}{2}$ in. The rod cap is secured by means of three bolts, two 11 millimeters in diameter and one of 14 millimeters in diameter.

The crankshaft is carried in four babbit-lined bronze shells, which in turn are secured to ribbed steel bearing caps.

The bearing caps are locked in the top of case by means of long U-bolts, such as are sometimes used on automobile spring saddles. The crankshaft has a diameter of 60 millimeters through with the exception of the propeller shaft end where the diameter is increased to 68 millimeters. The crank pins and main bearings are 72 $\frac{1}{2}$ millimeters long with the exception of the bearing in propeller end, which is 92 millimeters long. The shaft is drilled out for lightness, but oil is carried from the main bearings by means of thrower rings and separate small steel pipes to the connecting rod big ends. The front end of the crankshaft is splined to mount the starting gear and accessory drive.

Renault Carburetor

The carburetor only differs from the Mercedes in that it uses a single float chamber instead of two float chambers. There are two carburetors mounted on either side of the motor bolted to either side of the crankcase by means of long studs and the intake pipes, which are fastened by means of unions to the carburetors, are made of copper tubing, 48 millimeters in diameter.

The carburetor has a pair of primary nozzles and a pair of secondary nozzles and an auxiliary air valve which consists of an annular ring mounted concentric with a venturi throat. It would seem that this auxiliary air valve was a dangerous construction to go up in the air with, as it is very likely to stick.

Oil is to be carried through cast ducts in the front and rear compartments of the crank chamber to main bearings. It is also carried from these ducts through two copper tubes up to the overhead cam case and passes through the camshaft case from the propeller to the starting end of the motor and returns down through the distributing gearing case to the oil sump.

The valve gear is of very elaborate, expensive design. The main scheme of the construction is to use a light steel tube, carried on the studs from the cylinder head, which is slotted to take bronze cages which form both the camshaft bearings and rocker arm mountings. The rocker arms are arranged to multiply the cam motion so that the valve opens 12 millimeters. The camshafts are driven through straight bevel

gears and the driving shaft driven through straight bevel gears 12 $\frac{1}{2}$ millimeters face three module and the inclined shafts which drive the camshafts operate at three times camshaft speed. The high speed of these shafts and the resultant lowering in torque on them allows their weight to be considerably decreased.

At first sight it would seem that the construction is a very complicated and expensive one, but this arrangement turns out cheaper and very much lighter than where a train of spur gears is used for driving magnetos, camshafts, etc. The Peugeot company introduced the use of spur gears for overhead camshaft driving and this construction has been copied by Sunbeam, Wisconsin and Packard. In a twin six, or an eighteen-cylinder motor, the number of gears necessary with this gearing arrangement forms a maze of complications. The Rolls-Royce, Hispano-Suiza, Hall-Scott and Christofferson used bevel gears for driving the camshaft. All these designs are more or less an imitation of the original Mercedes. A few of the imitators seem to have grasped the importance of operating the auxiliary shaft of the magneto driving arrangements. There are four magnetos mounted on the same axis, each pair being driven through a spur gear, which in turn meshes with a spur gear which is slidably mounted on a splined magneto driveshaft. The magneto driveshaft terminates at its forward end in the sleeve of a bevel gear and is helically splined into the bevel gear so that when longitudinally displaced the shaft is also angularly displaced. This construction is quite costly, but avoids a lot of connections to magneto breaker boxes and it also insures a spark of the same intensity regardless of whether the ignition is advanced or retarded. The author has detailed construction of this motor to some extent and it would be impossible to give complete important details of construction of this motor without devoting the entire paper to it, and I think it is appreciated that the essential thing in connection with aeronautical motors is keen attention to detail.

At the front end of the crankshaft there is mounted an aluminum six-cylinder air-starting motor which engages the crankshaft by means of an overrunning clutch. This air-starting motor has a single inlet discharge valve for six cylinders and of the rotating disk type. There is also built integral with this starter a hand-starting gear and the starting magneto drive.

The Benz Motor

In the Kaiser prize contest for aviation motors a four-cylinder Benz motor of 130 by 180 millimeters won first prize, developing 103 brake horsepower at 1290 r.p.m. The fuel consumption was 210 grams per horsepower hour. Total weight of the motor was 153 kilograms. The oil consumption was .62 of a kilogram per horsepower hour. This motor was afterward expanded into a six-cylinder design and three different sizes were built.

The accompanying table gives some of the details of weight, horsepower, etc.:

Motor type.....	FB	FD	FF
Rated horsepower.....	85	100	150
Horsepower at 1250 r.p.m....	88	108	160
Horsepower at 1350 r.p.m....	95	115	160
Bore in millimeters.....	106	116	130
Stroke in millimeters.....	160	160	180
Offset of the cylinders in millimeters	18	20	20
The rate of gasoline consumption in grams.....	240	230	225
Oil consumption in grams per B. H. P. hour.....	10	10	10
Oil capacity in kilograms....	36	4	4 $\frac{1}{2}$
Water capacity in litres....	5 $\frac{1}{4}$	7 $\frac{1}{4}$	9 $\frac{1}{4}$

The weight with water and oil, but with two magnetos, fuel feeder and air pump in kilograms.....	170	200	245
The weight of motors including the water pump, two magnetos, double ignition, etc.	160	190	230
The weight of the exhaust pipe complete in kilograms	4	4 $\frac{1}{2}$	5 $\frac{1}{4}$
The weight of the propeller hub in kilograms.....	3 $\frac{1}{2}$	4	4
Price including cooling radiator in marks.....	10,000	11,500	14,000

The Benz cylinder design is simple, straightforward and every reliable construction and not particularly difficult to manufacture. The cylinder is cast of iron without a water jacket, but including 45 deg. angle elbows to the valve ports. The cylinders are machined wherever possible and at other points have been hand-filed and scraped, after which a jacket which is pressed in two halves is gas welded by means of short pipes welded on to the jacket. The bottom and the top of the cylinders become water galleries and by this means separate water pipes with their attendant weight, and complication are eliminated. Rubber rings held in aluminum clamps serve to connect the cylinder together. The whole construction turns out very neat and light. The cylinder walls are four millimeters or $\frac{1}{4}$ in. thick and combustion chamber is of cylindrical pancake form and is 140 millimeters or 5 $\frac{1}{2}$ in. in diameter. The valve seats are 68 millimeters in diameter and the valve port is 62 millimeters in diameter.

The passage joining the port is 57 millimeters in diameter. In order to insert the valves into the cylinder the valve stem is made with two diameters and the valve has to be cocked to insert it in the guide which has a bronze bushing at its upper end to compensate for the smaller valve stem diameter. The valve stem is 14 millimeters or $\frac{1}{2}$ in. diameter and is reduced at its upper portion to 9 $\frac{1}{4}$ millimeters. The valves are operated through a push rod and rocker arm construction which is $\frac{1}{2}$ in. and exceedingly light. Rocker arm supports are steel studs with enlarged heads to take a double row ball bearing. A roller is mounted at one end of the rocker arm to impinge on the end of the valve stem and the rocker arm has an adjustable globe stud at the other end. The push rods are light steel tubes with a wall thickness of $\frac{1}{4}$ of a millimeter and have a hardened steel cup at their upper end to engage the rocker arm globe stud and a hardened steel globe at their lower end to socket in the roller plunger.

Cast Iron Pistons

The pistons are of cast iron, and carry three concentric rings, $\frac{1}{4}$ -in. wide, on their upper end, which are pinned at the joint. The top of the piston forms the frustum of the cone and the pistons are 110 millimeters in length. The lower portion of the skirt is machined inside and has a wall thickness of 1 millimeter. Riveted to the piston head is a conical diaphragm which contacts with the piston pin when in place and serves to carry the heat off the center of the piston.

The piston and connecting rods are tubular and have a four-bolt construction on the big end, babbit-lined bronze bushings and are locked in place by means of connecting rod bolts which pass through the sides of the bushings.

The oil pump assembly comprises a pair of plunger pumps which draw oil from a separate outside pump and constructed integrally with it is a gear pump which delivers the oil under about sixty pounds pressure through a set of copper pipes in the base to the main bearings. The plunger oil pump

shows great refinement of detail. A worm wheel and two eccentrics are machined up out of one piece and serve to operate the plungers.

The mean effective pressures secured in this motor were probably never over 108 pounds and there are certain of the European motors that are now giving 30 deg. higher mean effective than this. In fact, the Benz company have produced a later design with four valves per cylinder of the same size, namely, 130 by 180 millimeters which gives 225 hp. at 1500 turns.

Sunbeam Aviation Motor

This very successful engine has been developed by Louis Coatalen. At the opening of the war the largest sized Coatalen motor was 225 hp., was of the L-head type having a single camshaft for operating valves and was an evolution from the twelve-cylinder racing car which the Sunbeam company had previously built. Since 1914 the Sunbeam company have produced engines of six, eight, twelve and eighteen cylinders from 150 to 500 hp. with both iron and aluminum cylinders. For the last two years all the motors have had overhead camshafts with a separate shaft for operating the intake and exhaust valves. Camshafts are connected through to the crankshaft by means of a train of spur gears, all of which are mounted on two double row ball bearings. In the twin six, 350 hp. engine, operating at 2100 r.p.m., it requires about 4 hp. to operate the camshafts. This motor gives 362 hp. at 2100 revolutions and has a fuel consumption of 51/100 of a pint per brake horsepower hour. The cylinders are 110 by 160 millimeters. The same design has been expanded into an eighteen-cylinder which gives 525 hp. at 2100 turns. There has also been developed a very successful eight-cylinder motor rated at 2220 hp. which has a bore and stroke of 120 by 120 millimeters, weight 450 lbs. This motor is an aluminum block construction with steel sleeves inserted. Three valves are operated, one for the inlet and two for the exhaust. One camshaft operates the three valves. This motor is very successful and besides being built by the Sunbeam company, is also being produced by the Austin Motor Co.

The modern Sunbeam engines operate with a mean effective pressure of 135 lbs. with a compression ratio of 6 to 1 at sea level. The connecting rods are of the articulated type as in the Renault motor and are very short. The weight of these motors turns out at 2.6 lbs. per brake horsepower, and they are able to go through a 100-hour test without any trouble of any kind. The lubricating system comprises a dry base and oil pump for drawing the oil off from the base, whence it is delivered to the filter and cooling system.

It then is pumped by a separate high pressure gear pump through the entire motor. In these larger European motors, castor-oil is used largely for lubrication. It is said that without the use of castor-oil it is impossible to hold full power for five hours. Coatalen favors aluminum cylinders rather than cast iron.

The Curtiss Aviation Motors

The Curtiss OX motor has eight cylinders, 4-in. bore, 5-in. stroke, delivers 90 hp. at 1400 turns, and the weight turns out at 4.17 lbs. per hp. This motor has cast iron cylinders with monel metal jackets, overhead inclined valves operated by means of two rocker arms, push and pull rods from the central camshaft located in the crankcase. The cam and push rod design is extremely ingenious and the whole valve construction turns out very light. This motor is an evolution from the early Curtiss type motor which was used by Glenn Curtiss when he won the Gordon Bennett Cup at Rheims. A slightly larger edition of this type motor is

the ONX, which has cylinders 4½ in. by 5 in., delivers 100 hp. at 1400 turns and has the same fuel and oil consumption as the OX type motor, namely, 6 lbs. of fuel per brake horsepower hour and .03 lb. of lubricating oil per brake horsepower hour. The Curtiss company have developed in the last two years a larger-sized motor now known as the V-2, which was originally rated at 180 hp. and which has since been refined and improved so that the motor gives 230 hp. at 1400 turns, with a fuel consumption of 52/100 of a pound per brake horsepower hour and an oil consumption of .03 of a pound per brake horsepower hour. This larger motor has a weight of 3.45 lbs. per horsepower and is now said to be giving very satisfactory service. The V-2 motor has drawn steel cylinders with a steel water jacket top and a monel metal cylindrical jacket, both of which are brazed on to the cylinder barrel itself. Both these motors use side by side connecting rods and fully forced lubrication. The camshafts act as a gallery from which the oil is distributed to the camshaft bearings, the main crankshaft bearings, and the gearing. Here again we find extremely short rods, which, as before mentioned, enables the height and the consequent weight of construction to be very much reduced. For ordinary flying at altitudes of 5000 to 6000 ft., the motors are sent out with an aluminum liner, bolted between the cylinder and the crankcase in order to give a compression ratio which does not result in pre-ignition at a low altitude. For high flying, however, these aluminum liners are taken out and the compression volume is decreased to about 18.6 per cent of the total volume.

Austro-Daimler

One of the first very successful European flying engines which was developed in Europe is the Austro-Daimler, which was built after the designs of Herr Porsche. The first of these motors had four cylinders, 120 by 140 millimeters, bore and stroke, with cast-iron cylinders, overhead valves operated by means of a single rocker arm, controlled by two cams and the valves were closed by a single leaf spring which oscillates with the rocker arm. The cylinders are cast singly and have either copper or steel jackets applied to them. The four-cylinder design was afterwards expanded to the six-cylinder design and still later a six-cylinder motor of 130 by 175 millimeters was developed.

This motor uses an offset crankshaft, as does the Benz motor, and the effect of offset will be discussed later on in this paper. The Benz motor also uses an offset camshaft which improves the valve operation and changes the valve lift diagram. In my estimation the intake pipe and carburetor arrangement on this engine are the best of any of the aviation motors.

The lubrication also is different than any other aviation motor, since individual high pressure metering pumps are used to deliver fresh oil only to the bearings and cylinders, as was the custom in automobile practice some 10 years ago.

JAMAICA HAS 833 CARS

The latest official census from Jamaica gives a total of 833 motor cars and trucks, which taken with a population of 850,000, all told, reflects a general prosperity. Those 2213 miles of main roads open for traffic, most of them macadamized highways, explain in part at least the proportion of motor vehicles to the number of residents. While the rainfall in certain parts of the island is excessive the roads are kept in good repair. American cars have the preference over all other

foreign makes. In 1915 95 per cent of the total imports of cars and trucks came from the United States.

Motor cars first became popular in Jamaica in 1909, when the total import amounted to \$74,783 in value. The next year the valuation increased to \$149,369, and in 1911 the imports of motor cars amounted to \$207,343.

The best selling cars have been those costing less than \$1,000, that is, at the American factory. Upkeep is very expensive. Gasoline was selling at 49 cents and 61 cents a gallon at the beginning of the year. Tires ranged from \$11.70 for the 30 by 3 and \$15.35 for the 30 by 3½ to as high as \$48.70 for the large sizes. A fairly efficient chauffeur, however, costs only \$5 and keep a week. Freight charges are very high, and motor cars are dutiable at the regular ad valorem rate of 16½ per cent.

Practically all the dealers are located at Kingston, the capital and largest city in Jamaica. Several American manufacturers have excellent representation, but others have seriously injured their prospective business by ill-advised agencies. Advertising is cheap and used to sell the cars often, though most of them are sold by personal solicitation. The usual terms are part cash and installments.

Tourist regulations encourage visitors to bring their motor cars to the island, for they are made free of duty when for personal use. A reimbursed deposit amounting to 30 per cent of the import duty is required as a guaranty that the car will be exported within two months. Cars so entered are exempt from road and other taxes for six weeks. On the expiration of two months, 5 per cent of the deposit is taken each month thereafter. After eight months, the deposit is exhausted and the import duty must be paid. Steamships also encourage visitors to take their cars to the island by providing their accompaniment as baggage and at special rates.

Jamaica has few motor trucks. The principal users of the twenty or thirty there are the corporations that deal in agricultural produce, a few individuals and the Government, which uses British-made trucks for mail service to all parts of the island. The private owners use American trucks, usually 3 tons, equipped with dual solid rear tires, high-stake body and tarpaulin top. While the market for trucks is not profitable perhaps, it is not discouraging. The establishment of any agency at Kingston is advised. Unusual equipment and parts, however, both for motor cars and for motor trucks, should be avoided.

SALESMEN TO HOLD CONVENTION

Toledo, Ohio, June 22—The Willys-Overland Co. will hold a convention of its star retail salesmen in September. A contest of sales will decide the delegates. Election to the congress will be decided by votes which will be points for each car sold.



Linking New York and Chicago

Three Routes That Offer Touring Possibilities

WITH this issue MOTOR AGE begins a series of weekly reports in which will be covered during the touring season the main routes between the major cities of the United States. No effort will be made to give points of interest on these routes, but rather to give the tourist such information as will be valuable to him in making his tour in comfort. In this series of reports will be told the kind of roads you may expect in the various localities and where there is new construction and repair that may make detours necessary. If these detours are necessary they will be described and the probable time given during which a change of routing will be required.—Editor.

WITH the opening of the touring season MOTOR AGE begins a series of reports on roads, their type and travelability between the principal cities of the country. No specific schedule will be adhered to, nor will comparisons of scenic attractions of one road as against another be given, but information of practical value to the tourist will be detailed. It is assumed that you, Mr. Tourist, if you are planning a tour of a week of two weeks, or more, naturally will want to know what kind of roads you will find on the particular trip you have laid out. If there are bad stretches that require detouring you should know it in advance. Also, if a road is one that is not affected by bad weather, is in fact, an all-year road, such information will be of value to you. The information given from week to week will be obtained through various sources such as the Automobile Blue Book reports, letters from tourists and from road associations and motor clubs. Once a route is described it will not be described again except when changes are made, such as reconstruction which makes detours necessary, or when the work has been completed and the necessity for detouring has been removed.

Chicago to New York

This week we will take up the main routes between Chicago and New York, with some branch roads to other large cities close to the main-traveled highways. There are three routes to New York, the most direct of which is by way of South Bend and Kendallville, Ind., Bryan, Wauseon, Toledo, Fremont, Norwalk, Elyria, Oberlin, Cleveland, Ashtabula and Conneaut, Ohio, Erie, Pa., Buffalo, Batavia, Geneva, Syracuse, Utica, Schenectady, Albany and Poughkeepsie, N. Y. This is the shortest route with practically all good road. For example between Chicago and Toledo the road is hard, but much of it might be called a 20-mile road. There are some rough stretches between Wauseon and Toledo, Ohio, but the majority of it is gravel or macadam. At Wauseon the better road to Detroit branches off, going through Adrian, Saline, Ypsilanti. One can also leave this main route at Toledo and go to Detroit through Ida and Monroe. From Toledo to Cleveland the road is all good and from Cleveland to Ashtabula it is boulevard. From Ashtabula on through Erie to Buffalo there are some bad places,

but fairly good time can be made. Two days can be saved by shipping from Detroit to Buffalo, a charge of \$15 for the car and \$3 per passenger being made. The boat leaves Detroit at 6 o'clock and reaches Buffalo at 9 a. m.

From Buffalo to New York, by way of Batavia, Canandaigua, Syracuse, Utica and Albany the road is good the year around. This route takes in the Mohawk trail. There is little difference between the roads on the east side of the Hudson from Albany to Kingston, although the road on the east side of the river should be followed through Poughkeepsie to New York.

There is a route perhaps more scenic between Westfield and Kingston, N. Y., which takes more time and is not so good as the one previously mentioned. This is by way of Jamestown, Olean, Hornell, Elmira and Binghamton. The side trip from Elmira north to two of the Finger Lakes and back to the main route at Owego is bad dirt.

The Lincoln highway from Chicago to Pittsburgh is a third choice to the east. East of Fort Wayne there are stretches

which tourists recently passing over this route say require "four hours to go 12 miles." Through Ohio the Lincoln highway is not very desirable in a number of places and either the northern route to New York, or the one to be described later has the advantage.

For the tourist who is not in a hurry, that is, who does not mind extra mileage if roads are good, a roundabout route to New York is from Chicago through Indianapolis, Richmond, Ind., Dayton, Springfield, Columbus and Zanesville, Ohio, to Washington, Pa., where an option of the Lincoln highway through Pittsburgh, Bedford, Gettysburg and Lancaster to Philadelphia, or by way of Cumberland and Hagerstown, Md., to Washington, Baltimore and Philadelphia is offered. From Philadelphia the route to New York is by way of Trenton and Elizabeth, N. J.

Good Roads to Indianapolis

This latter route out of Chicago may be utilized in reaching Louisville or Cincinnati from Chicago. The road into Indianapolis is good all the way, as is that from the Hoosier metropolis to Columbus, varying between gravel and macadam. From Columbus to Zanesville it is all new brick. The more southern of these options from Washington, Pa., to Philadelphia is the Old National Road and is good macadam almost the entire distance, while the Lincoln highway from Pittsburgh east to Philadelphia is fine macadam, always good. The road up the coast takes in stretches of the best road to be found anywhere in the country. From Elkton, Md., to Chaster, Pa., there is a short stretch that runs fair-to-poor, but may be called a 20-mile highway.

There is a cut-off between Cleveland and Pittsburgh of about 150 miles of which about 50 miles is bad dirt. Dirt roads, on account of the peculiar season this year are not good anywhere in the country. It will require several weeks of good weather to put them in shape. However, on the routes mentioned to New York from Chicago there is very little dirt. The map produced herewith shows the routes mentioned and the numbers with the legends corresponding indicate the type of construction and the usual condition of these routes. There is opportunity offered for some fine circle tours in these three main routes to New York from the Middle-Western metropolis.

BATTERY SERVICE BROADENED

Detroit, June 25—A restroom for women, telephones and magazines for patrons' use, all service given inside, testing and opening the batteries in the presence of customers—these are a few of the features that make the Willard service station here something different.

Briefly, the building covers 25,000 sq. ft. In front are offices, telephone booths and restroom. Immediately back is the garage, capable of accommodating seventy-five cars. Back of that are the charging rooms, repair shop and stockroom.

The station is built from a customer's point of view in that the owner drives in the front door and is met immediately by a floorman. If his battery is to be tested and filled, the work is done at once and he goes out of one of the side doors. If his battery needs repairs or recharging the car is placed in a stall, the battery is removed and "a renter" installed in its place. The owner's battery is taken to the office and tested while the customer himself looks on. The owner sees what the battery needs, gives the order for this work, gets a receipt for his battery and goes on.



Routes and Touring Information



Hoopeston, Ill.-Colorado Springs, Colo.

HOOPESTON, ILL.—Editor Motor Age—Advise route from here to Colorado Springs.—J. W. Brier.

From Hoopeston the route leads to Bloomington, Lincoln, Elkhart, Williamsville, Springfield, Litchfield, Mount Olive, Staunton, Hamel, Edwardsville, Maryville, Collinsville, East St. Louis, Ill., St. Louis, Mo., St. Charles, Cottleville, Wentzville, Wright City, Warrenton, Williamsburg, Fulton, Columbia, Midway, Rocheport, New Franklin, ferry across Missouri river, Boonville, Arrow Rock, Marshall, Grand Pass, Waverly, Dover, Lexington, Wellington, Levasy, Independence, Kansas City, Kansas City, Kans., Bonner Springs, De Soto, Eudora, Lawrence, Topeka, Silver Lake, Rossville, St. Mary's, Wamego, Wabunsee, Manhattan, Ogden, Fort Riley, Junction City, Chapman, Detroit, Abilene, New Cambria, Salina, Ellsworth, Wilson, Dorrance, Russell, Victoria, Hays, Yocemento, Ellis, Ogallah, Wakeeney, Quinter, Grainfield, Oakley, Colby, Brewster, Goodland, Ruleton, Kanorado, Kan., Burlington, Col., Stratton, Seibert, Flagler, Limon, Ramah, Calhan to Colorado Springs.

Vols. 5 and 7 of the Automobile Blue Books, published by the Automobile Blue Book Publishing Co., 910 South Michigan avenue, Chicago, contain complete running directions for this trip.

Cincinnati, Ohio-St. Petersburg, Fla.

Bradford, Ohio—Editor Motor Age—Advise the best route from Cincinnati to Jacksonville or St. Petersburg, Fla.—Samuel Hart.

From Cincinnati drive to Mack, Clevel., Ohio, Homestead, Ind., Lawrenceburg, Aurora, Oberdeen, Vevay, Ohio River ferry, Carrollton, Ky., New Castle, Eminence, Shelbyville, St. Mathews, Louisville, Shively, Orel, Meadowlawn, West Point, Elizabethtown, Upton, Bonnierville, Munfordville, Woodsonville, Rowletts, Horse Cave, Cave City, Glasgow Junction, Bowling Green, Shakertown, Auburn, Russellville, Adairville, Springfield, Tenn., Green Brier, Goodlettsville, Edenwood, Madison, Nashville, LaVergne, Jefferson, Walter Hills, Murfreesboro, Deason, Shelby-

ville, Bellville, Fayetteville, Hazel Green, Ala., Meridianville, Huntsville, Ala., Owens Cross Roads, New Hope, Cottonville, North, Tennessee River ferry, Guntersville, Albertville, Boas, Mountainboro, Attalla, Alabama City, Gadsden, Rome, Ga., Cartersville, Emerson, Allatoona, Acworth, Kennesaw, Marietta, Smyrna, Atlanta, Mount View Station, Darceys Cross Station, Jonesboro, Lovejoy, Hampton, Pomona, Griffin, Milner, Barnesville, Forsyth, Lorane Station, Macon, Perry, Henderson, Vienna, Graydon, Cordale, Arabi, Biblesy, Worth, Ashburn, Sycamore, Tifton, Eldorado, Staunton, Lenox, Sparks, Adel, Cecil, Hahira, Mineola, Valdosta, Lake Park, Ga., Jennings, Jasper, Genoa, White Springs, Suwanee, Winfield, Lake City, Wattertown, Olustee, Saunderson, Macclenny, Baldwin, Whitehouse, Jacksonville, St. Johns River ferry, Durbin, Woodland, St. Augustine, New Augustine, Elkton, Deep Creek, Hastings, Byrd, Bunnell, Ormond, Daytona, Deland, Orange City, Monroe, Sanford, Longwood, Altamonte Springs, Maitland, Winter Park, Orlando, Pinecastle, Taft, Klammer, Campbell, Loughman, Davenport, Haines City, Lake Alfred, Auburndale, Carters, Lakeland, Youmans, Plant City, Dover, Seffner, Mango, Oak Park, Tampa, Safety Harbor, Bayview, Pinellas Park, to St. Petersburg, Fla.

Vol. 6 of the Automobile Blue Books, published by the Automobile Blue Book Publishing Co., 910 South Michigan avenue, Chicago, contains complete running directions for this trip.

Hattiesburg, Miss.-New York

Hattiesburg, Miss.—Editor Motor Age—Give route from here to New York.—J. L. Doyle.

From Hattiesburg proceed to Ellisville, Laurel, Saundersville, Heidelberg, Shubuta, Quitman, Meridian, Livingston, Coatsopa, Moscow ferry, Damopolis, Faunsdale, Uniontown, Blalock, Safford, Martin Station, Orrville, Hasen, Beloit, Selma, Benton, Lowndesboro, Burkville, Montgomery, Mount Meigs, Shorter, Tuskegee, Notasulga, Loachapika, Auburn, Opelika, Beulah, Langdale, Lanett,

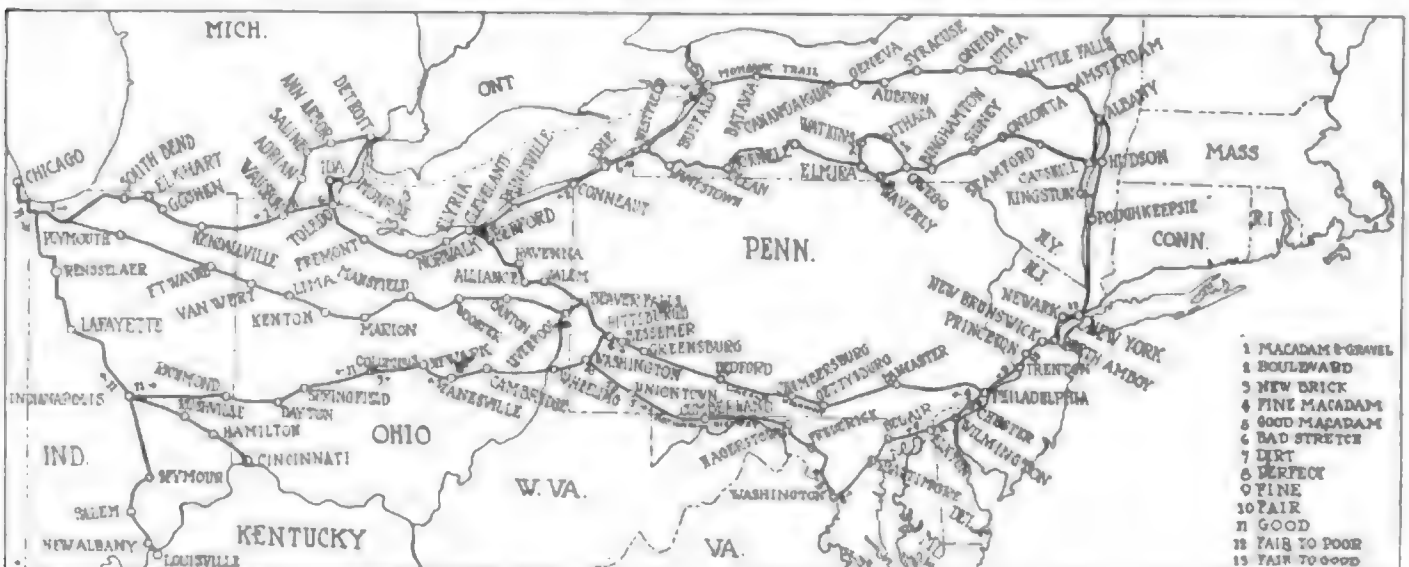
West Point, Lagrange, Louise, Hogansville, Trimble, Grantville, Moreland, Newman, Union City, Stonewall, Fort McPherson, Atlanta, Druid Hills, Decatur, Ingleside, Clarksonton, Stone Mountain, Snellville, Grayson, Between, Monroe, Athens, Neece, Ila, Franklin Springs, Royston, Hartwell, Browns ferry, Anderson, S. C., Grove, Greenville, Burlington, Graham, Mebane, Hillsboro, Durham, Bragtown, Knapp of Reeds, Stem, Providence, Oxford, Stovall, Bullock, N. C., Clarksville, Boynton, South Hill, Cambridge, Blackstone, Petersburg, Manchester, Richmond, Ashland, Coatesville, Mantico, Chilesburg, Partlow, Small, Spotsylvania, Fredericksburg, Falmouth, Mountain View, Garrisonville, Dumfries, Occoquan, Lorton, Accotink, Alexandria, Washington, D. C., Beltsville, Laurel, Baltimore, Kingsville, Bel Air, Churchville, Aberdeen, Havre de Grace, Perryville, Pincipio Furnace, Charlestown, North East, Elkton, Newark, Del., Wilmington, Marcus Hook, Pa., Chester, Norwood, Darby, Philadelphia, Bustleton, La Trappe, Langhorne, Trenton, Lawrenceville, Princeton, Kingston, Franklin Park, New Brunswick, Metuchen, Iselin Station, Rahway, Elizabeth, Newark, Jersey City, Weehawken ferry, New York.

Vol. 6 of the Automobile Blue Books, published by the Automobile Blue Book Publishing Co., 910 South Michigan avenue, Chicago, contains complete running directions for this trip.

Canton, Ill.-Boston, Mass.

Canton, Ill.—Editor Motor Age—Would like best route from here to Boston, and approximate mileage.—H. T. Cooper.

The route follows through Gravel Hill, Wayland, Keokuk, Hamilton, Ill., Elvaeton, Carthage, Burnside, Laharpe, Roseville, Monmouth, Galesburg, Knoxville, Brimfield, Kickapoo, Peoria, Washington, Metamora, Lowpoint, Washburn, Varna, Mount Palatine, Tonica, Ottawa, Morris, Minooka, Joliet, New Lenox, Frankfort, Dyer, Ind., Sherrerville, Merrillville, Valparaiso, Laporte, South Bend, Mishawaka, Elkhart, Goshen, Benton, Ligonier, Wawaka, Brimfield, Kendallville, Butler, Edgerton, Ohio, Bryan, Archbold, Wau-



This map shows the three major routes to New York from Chicago and the numbers and legends indicate what the tourist may expect of road surface between the points where corresponding figures are found. The dotted line through Lake Erie shows where two days may be saved by shipping the car at a cost of \$15

seon, Toledo, Lemoine, Woodville, Fremont, Clyde, Bellevue, Monroeville, Norwalk, Townsend, Wakeman, Oberlin, Elyria, Morleys Corners, Cleveland, Willoughby, Painesville, Unionville, Geneva, Ashtabula, Conneaut, Ohio, Girard, Erie, Harbour Creek, Moorheadville, North East, Pa., Ripley, N. Y., Forsyth, Westfield, Portland, Brocton, Lamber-ton, Fredonia, Sheridan, Silver Creek, Irving, Brant, Angola, Evans, Bay View, Buffalo, Snyder, Williamsville, E. Pembroke, Batavia, Leroy, Caledonia, Avon, East Avon, Lima, West Bloomfield, Canandaigua, Geneva, Wat-erloo, Seneca Falls, Auburn, Sennett, El-bridge, Camillus, Syracuse, Manlius Center, Mycenae, Chittenango, Canastota, Wamps-ville, Oneida Castle, Vernon, Utica, Frank- fort, Ilion, Mohawk, Herkimer, Little Falls, St. Johnsville, Nelliston, Palatine Bridge, Ponda, Tribes Hill, Amsterdam, Scotia, Schenectady, Albany, Rensselaer, East Green- bush, New Lebanon, Shaker Village, Mass., Pittsfield, Lenox, Lee, Bonnyrigg, Hunting- ton, Russell, Woronoco, Westfield, Springfield, North Wilbraham, Palmer, Warren, Brook- field, Spencer, Leicester, Worcester, Shrews- bury, Northboro, Marlboro, South Sudbury, Wayland, Weston, Auburndale, Newton, Coolidge Corner, to Boston. This trip ap- proximates 1,325 miles.

Vols. 5, 4, 1 and 2 of the Automobile Blue Books, published by the Automobile Blue Book Publishing Co., 910 South Michigan ave- nue, Chicago, contain complete running di- rections.

Owensboro, Ky.—Birmingham, Ala.

Owensboro, Ky.—Editor Motor Age—Give route from here to Birmingham, Ala.—W. L. Hitt.

From Owensboro proceed to Henderson, Weaverton, Cairo, Pooje, Wanamaker, Dixon, Nebo, Madisonville, Earlington, Barnesley, Nortonville, Crofton, Hopkinsville, Clarks- ville, Adams, Cedar Hill, Springfield, Nash- ville, Denbar, Franklin, Spring Hill, Meapo- lis, Columbia, McCains, Waco, Pulaski, Elk- mont, Ardmore, Hollands Gin, Elkmont, Ala., Athens, Tennessee River ferry, Decatur, Al- bany, Flint, Hartsville, Falkville, Cullman, Hanceville, Garden City, Blountsville, Cleve- land, Oneonta to Birmingham.

Vols. 4 and 6 of the Automobile Blue Books, published by the Automobile Blue Book Pub- lishing Co., 910 South Michigan avenue, Chi- cago, contain complete running directions for this trip from Henderson on.

Shreveport, La.—Niagara Falls, N. Y.

Shreveport, La.—Editor Motor Age—Would like best routing from here to Niagara Falls, N. Y.—J. B. Herold.

From Shreveport the route follows: Min- den, Arhens, Arcadia, Simsboro, Ruston, Choudrant, Calhoun, Monroe, Bastrop, Oak Ridge, ferry across Lake LaForte, Girard, Rayville, Holly Ridge, Delhi, Ferry, Waverly, Quebec, Tallulah, Delta, La., Mississippi River ferry, Vicksburg, Miss.; Edwards, Bol- ton, Jackson, Brandon, Fannin, Plagah, Mor- ton, Forest, Newton, Hickory, Chunky, Me- ridian, Daleville, DeKalb, Macon, Brookville, Crawford, Columbus, Vernon, Ala., Guin, Hamilton, Hackleburg, Duketon, Russellville, Tusculumbia, Sheffield, Florence, St. Florian, St. Joseph, Tenn., Loretto, Leone, Lawrence- burg, Rockdale, Sandy Hook, Mt. Pleasant, Columbia, Spring Hill, Franklin, Nashville, Madison, Edenwold, Gootlettsville, Green Brier, Springfield, Tenn., Adairville, Ky.; Russellville, Auburn, Shakertown, Bowling Green, Glasgow Junction, Cave City, Horse Cave, Rowlett, Woodsonville, Munfordville, Bonnierville, Upton, Elizabethtown, West Point, Meadowlawn, Orel, Shively, Louisville, Shelbyville, New Castle, Carrollton, Ky., ferry across Ohio river, Oberdeen, Rising Sun, Aurora, Lawrenceburg, Homestead, Ind., Cleves, Cincinnati, Sharon, Mason, Lebanon,

Waynesville, Xenia, Cedarville, South Charleston, London, West Jefferson, Colum- bus, Granville, Newark, Hanover, Frazeys- burg, Dresden, Coshocton, Newcomerstown, Port Washington, Gnaddenbutten, Uhricha- ville, New Philadelphia, Dover, Strasburg, Beach City, Navarre, Massillon, Canton, Akron, Ghent, Brecksville, Cleveland, Wil- loughby, Painesville, Unionville, Geneva, Ashtabula, Conneaut, Ohio, Girard, Erie, Har- bour Creek, Moorheadville, North East, Pa.; Ripley, N. Y., Westfield, Portland, Lamber- ton, Fredonia, Sheridan, Silver Creek, Irving, Brant, Angola, Evans, Bay View, Buffalo, to Niagara Falls.

Vols. 7, 6 and 4 of the Automobile Blue Books, published at 910 South Michigan ave- nue, Chicago, contain complete running di- rections for this trip.

Hinckley, Ill.—Cadiz, Ohio

Hinckley, Ill.—Editor Motor Age—Would like routing from here to Cadiz, Ohio.—J. A. Naah.

From Hinckley, Ill., proceed to Aurora, Naperville, Chicago, South Chicago, Hess- ville, Highland, South Gary, Hobart, Wheeler, Valparaiso, Westville, Laporte, South Bend, Ligonier, Merriam, Churubusco, Fort Wayne, New Haven, Ind., Van Wert, Ohio, Delphos, Lima, Kenton, Meeker, Marion, Delaware, Columbus, Granville, Newark, Jacksontown, Linnville, Zanesville, Cambridge, Uhricha- ville, Dennison, to Cadiz.

Vol. 4 of the Automobile Blue Book, pub- lished by the Automobile Blue Book Pub. Co., 910 South Michigan avenue, Chicago, contains complete running directions for the above trip.

Chicago—Winnipeg, Can.

Maywood, Ill.—Editor Motor Age—Outline a route from Chicago to Montmartre, Sask., via Cedar Rapids, Waterloo, Iowa, Minne- apolis and St. Cloud, Minn.—J. L. Hoff.

As we have no route information on Cana- dian roads west of Winnipeg, we are routing you only to that point and would suggest that you get information from the Winnipeg Automobile Club as to your way west from there. From Chicago proceed to Maywood, Elmhurst, Lombard, North Glen Ellyn, West Chicago, Geneva, DeKalb, Creston, Rochelle, Ashton, Dixon, Sterling, Morrison, Fulton, Clinton, Dewitt, Grandmound, Wheatland, Lowden, Mechanicsville, Mount Vernon, Marion, Cedar Rapids, Newhall, Vinton, La- porte City, Washburn, Waterloo, Janesville, Waverly, Plainfield, Nashua, Charles City, Orchard, Osage, Mitchell, Lyle, Austin, Lansing, Blooming Prairie, Owatonna, St. Paul, Minneapolis, Robbinsdale, Osseo, Champlin, Anoka, Elk River, St. Cloud, St. Joseph, Avon, Albany, Freeport, Sauk Center, West Union, Osakia, Alexandria, Garfield, Grandon, Evansville, Ashby, Fergus Falls, Elizabeth, Rothsay, Barnesville, Baker, Moorehead, Fargo, Mapleton, Hillsboro, Taft, Reynolds, Thompson, Merrifield, Grand Forks, Manvel, Ardoch, Minto, Grafton, Auburn, St. Thomas, Glasston, Hamilton, Pembina—report at U. S. Customs House—Emerson, Man.—report at Canadian custom house—Lettellier, St. Jean Baptiste, Morris, St. Agathe, St. Norbert, Winnipeg.

Vol. 6 of the Automobile Blue Books, pub- lished by the Automobile Blue Book Pub. Co., 910 South Michigan avenue, Chicago, con- tains complete running directions for the above routing.

Bretton Woods, N. H.—Chicago-Denver, Col.

Denver, Colo.—Editor Motor Age—Outline a route from the White Mountain District of New Hampshire to Denver, via Chicago — H. A. Landsley.

From Bretton Woods the route follows, Twin Mountain House, Bethlehem Junction, Bethlehem, Littleton, Lashen, Bath, Haver- hill, Piermont, Orford, Lyme, Hanover,

White River Junction, Hartford, Quechee, Taftsville, Woodstock, Bridgewater, Sher- burne, Mendon, Rutland, Fairhaven, White- hall, N. Y., Comstock, Fort Ann, Kingsbury, Hudson Falls, Glens Falls (detour to Lake George if desired), Wilton, Saratoga Springs, Ballston Station, Manny Corners, Amster- dam, Schenectady, Amsterdam, Fort John- son, Ponda, Palatine Ridge, St. Johnsville, Little Falls, Herkimer, Mohawk, Frankfort, Utica, Vernon, Wampsville, Canastota, Chit- tenango, Manlius Center, East Syracuse, Syracuse, Camillus, Elbridge, Weedsport, Port Byron, Savannah, Lock Berlin, Lyons, Newark, Palmyra, Macedon, Fairport, Roch- ester, Churchville, Batavia, Crittenden, Bow- mansville, Buffalo, Evans, Angola, Brant, Farnham, Irving, Silver Creek, Sheridan, Fre- donia, Brocton, Portland, Westfield, Ripley, North East, Moorheadville, Erie, Girard, Con- neaut, Ohio, Ashtabula, Geneva, Unionville, Painesville, Willoughby, Cleveland, Morleys Corners, Elyria, Oberlin, Wakeman, Norwalk, Monroeville, Belleville, Clyde, Fremont, Brad- ner, Portage, Napoleon, Ridgeville, Archbold, Bryan, Edgerton, Ohio, Butler, Ind., Ken- dallville, Wawaka, Ligonier, Benton, Goshen, Elkhart, Mishawaka, South Bend, New Car- lisle, "The Bootjack" road fork, Rolling Prairie, Michigan City, East Gary, Miller, Aetna Station, Calumet, East Chicago, South Chicago, Chicago, Maywood, Lombard, North Glen Ellyn, West Chicago, Geneva, DeKalb, Creston, Rochelle, Ashton, Dixon, Sterling, Morristown, Unionville, Fulton, Lyons, Clin- ton, Iowa, Dewitt, Grandmound, Wheatland, Lowden, Mechanicsville, Mount Vernon, Ma- rion, Cedar Rapids, Belle Plaine, Chelsea, Tama, Montour, LeGrand, Marshalltown, Le- moille, Nevada, Ames, Boone, Ogden, Grand Junction, Jefferson, Glidden, Carroll, West Side, Vail, Denison, Marion, Dunlap, Wood- bine, Logan, Missouri Valley, Council Bluffs, Omaha, Neb., Waterloo, Fremont, Ames, North Bend, Schuyler, Richland, Columbus, Duncan, Silver Creek, Clarke, Central City, Chapman, Grand Island, Alda, Wood River, Shelton, Gibbon, Kearney, Elm Creek, Lex- ington, Willow Island, Gothenberg, North Platte, Sutherland, Paxton, Ogallala, Brule, Bigspring, Julesburg, Red Lion, Sterling, Brush, Fort Morgan, Weldon, Goodrich, Or- chard, Kersey, Greeley to Denver.

Vols. 2, 1, 4, 5 and 7 of the Automobile Blue Book contain complete running di- rections for this trip.

Henrietta, Tex.—Hannibal, Mo.

Henrietta, Tex.—Editor Motor Age—What route shall I take from here to Hannibal, Mo.? Give mileage between towns.—K. N. Hapgood.

From Henrietta the route follows Wichita Falls, Burk Burnett, Randlett, Okla., Law- ton, Fort Sill, Apache, Anadarko, Verden, Pocaaset, Union, El Reno, 170 miles, Pack- ington, Yukon, El Reno, 34 miles, Yukon, Packington, Oklahoma City, 34 miles, De- pew, Bristow, Kellyville, Sapulpa, Bowden, Red Fork, Tulsa, 109 miles, Collinsville, Clare- more, Sequoyah, Bushyhead, Chelsea, Catale, Venita, Miami, Commerce, Lincolnville, Bax- ter Springs, Kan., Lowell, Galena, Joplin, Mo., 143 miles, Galesburg, Nashville, Liberal, Brenaugh, Moundsville, Nevada, Horton, Ar- thur, Rich Hill, Butler, Adrian, Archie, Har- risonville, Kansas City, 179 miles, Independ- ence, Levasy, Weirington, Lexington, Waverly, Grand Pass, Marshall, Arrow Rock, Booneville, ferry across Missouri River, New Franklin, Rocheport, Columbia, 164 miles, Mexico, Perry, New London, Hannibal. We are unable to give the mileage from Col- umbia to Hannibal.

Vol. 7 of the Automobile Blue Book pub- lished by the Automobile Blue Book Pub. Co., 910 South Michigan Avenue, Chicago, contains full running directions from Hen- rietta to Columbia.



How to Get a Job in Car Factory

By Allen Sinsheimer

HOW can I get work in the motor industry? How can I apply for a position? What qualifications are demanded? What wages may I expect?

These are questions asked daily by men everywhere who are anxious to work in the motor industry. Following are the questions most frequently asked, with answers gathered from many car and parts makers for the benefit of those seeking motor car factory or office employment. They display the general qualifications, positions, wages, methods of applying for work and other important information.

The majority of factories have organization plans arranged with the stockholders and directors at the head, the president, the general manager and assistant general manager next in the order named, and all of these comprise the executive or administrative division, which controls the

Accounting department

Engineering department

Production department

Sales department

These in turn control many minor divisions, which are

1—Accounting department.

- a—Bookkeeping
- b—Cashier
- c—Ordering

2—Engineering department

- a—Experimental
- b—Designing
- c—Laboratory testing
- d—Investigation
- e—Drafting

3—Production department

- a—Labor, including welfare, time-keeping and employment divisions
- b—Purchasing department
- c—Machinery layout
- d—Raw material supplies
- e—Traffic
- f—Shipping
- g—Commercial tests

4—Sales department

- a—Advertising
- b—Service
- c—Branches
- d—Agencies
- e—Sales promotion, including racing, tests, etc.

There is always room for a limited number of workers in the motor industry. At present 225,000 men are engaged in the industry in Michigan and Toledo, Ohio, and 15 per cent, or 33,000, leave or are discharged from their positions every month, which creates opportunity for others.

Every company has its own plans for employing workers. In many personal applications are desired; others demand application by letter. Some employ practically every worker through the employment department, while others hire factory employees through the employment department, sales employees through the sales department, bookkeepers through the auditing department and so forth.

ADMINISTRATION

PRODUCTION

ACCOUNTING

SALES

ENGINEERING

LABOR
WELFARE
EMPLOYMENT
PURCHASE
MACHINERY LAYOUT
RAW MATERIALS
TRAFFIC
SHIPPING
COMMERCIAL TESTS

AUDITING
BOOK KEEPING
PAYROLL
FINANCING

ADVERTISING
SERVICE
BRANCHES
SALES PROMOTION
RACING
TESTS AND CONTESTS

EXPERIMENTAL
DESIGN
LABORATORY TESTS
INVESTIGATION
DRAFTING

Outline of the average factory layout, showing different departments and their connections with the administrative division

Many concerns demand machine shop, garage or motor car school training for factory work, while others make no stipulations. Some require that the applicant be a resident of the city in which the plant is located, while others are willing to take men from other cities.

Wages vary slightly. Salaries range from \$2.50 to \$5 a day for unskilled labor based on an hourly scale of from 25 cents to 62½ cents. Skilled workers are paid higher amounts, according to their ability and experience.

There are several motor car and parts makers in Michigan and Ohio. These have been asked the following questions, which are frequently asked of Motor Age by readers. The answers selected from some of the larger concerns give a definite knowledge of the employment conditions and requirements.

1—Must I be a resident of the city in which the factory is located?

Ford Motor Co., Detroit	Residents are given preference.
Willys-Overland Co., Toledo, Ohio	No.
Buick Motor Co., Flint, Mich.	No.
Studebaker Corp., Detroit	No.
Chalmers Motor Co., Detroit	No.
Hudson Motor Car Co., Detroit	No.
Packard Motor Car Co., Detroit	Yes.
Saxon Motor Car Corp., Detroit	No.
Olympian Motors Co., Pontiac, Mich.	Yes.
Briscoe Motor Corp., Jackson, Mich.	Preferably, yes; but non-residents of ability also are acceptable.
Milburn Wagon Co., Toledo, Ohio	Yes.
Continental Motor Corp., Detroit	No.
The Auto Body Co., Lansing, Mich.	No.
Master Carburetor Co., Detroit	No.
Detroit Lubricator Co., Detroit	Not necessarily, but preference given to residents of Detroit, which fact indicates more likelihood of permanent employment.

2—Must I make application in person?

Ford Motor Co.	In most cases we demand application in letter form, mailed directly to the employment office.
Willys-Overland Co.	No.
Buick Motor Co.	Not in all cases.
Studebaker Corp.	No.
Chalmers Motor Co.	No.
Hudson Motor Car Co.	Yes.
Packard Motor Car Co.	Yes.
Saxon Motor Car Corp.	Much preferred.
Olympian Motors Co.	Preferably.
Briscoe Motor Corp.	It is our rule that all applicants appear in person.
Milburn Wagon Co.	Yes.
Continental Motor Corp.	Yes.
The Auto Body Co.	Yes.
Master Carburetor Co.	Yes.
Detroit Lubricator Co.	Yes.

3—Must I have garage or machine shop experience?

Ford Motor Co.	Preferably, yes.
Willys-Overland Co.	No.
Buick Motor Co.	Not if you are quick to learn and can think, act and judge for yourself.
Studebaker Corp.	No. We prefer to teach the men.
Chalmers Motor Co.	Yes, if seeking work in the machine shop.
Hudson Motor Car Co.	Not necessary, since there are many positions in a motor car factory that do not require experienced men.
Packard Motor Car Co.	No.
Saxon Motor Car Corp.	Any mechanical experience is an aid.
Olympian Motors Co.	Preferably, but not necessarily if willing to begin under instruction.
Briscoe Motor Corp.	Experience in these lines enables us to give a slightly higher rates to those seeking employment.
Milburn Wagon Co.	No, but preferable.
Continental Motor Corp.	No.
The Auto Body Co.	No.
Master Carburetor Co.	For position in service department, yes.
Detroit Lubricator Co.	Very valuable. Aids in making carburetor assemblies or service men.

4—Must I have training from a motor car school?

Ford Motor Co.	No.
Willys-Overland Co.	No.
Buick Motor Co.	Not necessary, but helpful in some departments.
Studebaker Corp.	Not essential.
Chalmers Motor Co.	No, but it is quite a help to a young man who wishes to enter the motor industry.
Hudson Motor Car Co.	If you desire to do assembling or motor repair or tuning, yes.
Packard Motor Car Co.	No.
Saxon Motor Car Corp.	No.
Olympian Motors Co.	No.
Briscoe Motor Corp.	Motor car school students are given a slight preference, but begin at beginners' rates.
Milburn Wagon Co.	No.
Continental Motor Corp.	No.
The Auto Body Co.	No.
Master Carburetor Co.	Not necessarily.
Detroit Lubricator Co.	This training from a good school gives a man a decided advantage.

5—What salary shall I expect?

Ford Motor Co.	Depends on ability—whether or not a tradesman of the kind needed—general skill. The Ford company pays beginners 34½ cents an hour and places them on a probationary basis for six months. If in that time they have eliminated all evil habits and inaugurated clean home life as dictated by an advisor of the company, they are given an additional salary in the form of a share of the profits, amounting to 25 cents, making
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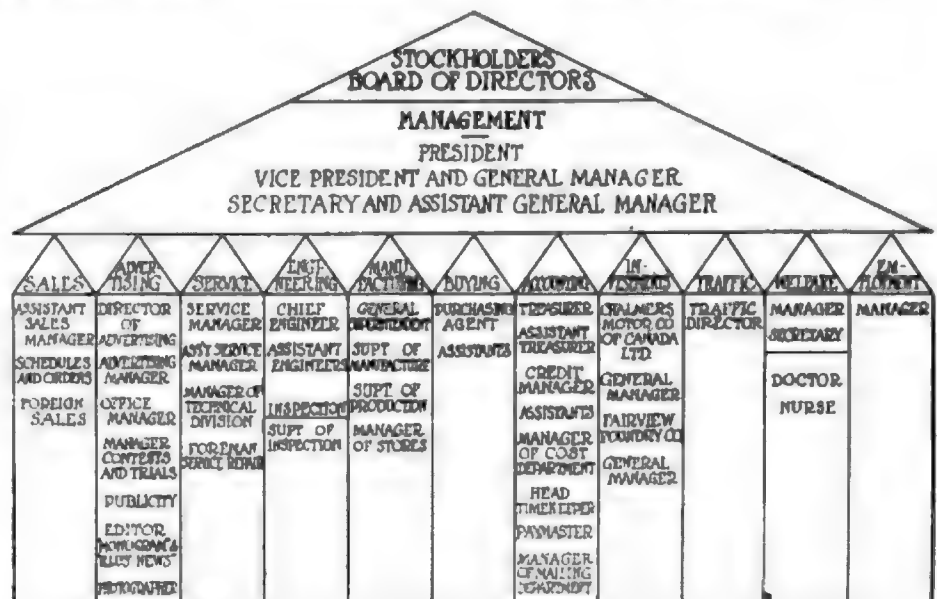
a total of 62½ cents, or \$5 a day. This wage is for unskilled workers. Skilled men are given higher wages, according to ability.

Willys-Overland Co.	Depends entirely on ability.
Buick Motor Co.	Depends on ability by showing what you can do.
Studebaker Corp.	Twenty-eight cents an hour up.
Chalmers Motor Co.	Most machine and assembly jobs are piecework. Pieceworkers making from \$2.50 to \$5, depending on their ability and speed. The hour rate is computed according to the applicant's experience.
Hudson Motor Car Co.	About 34 cents an hour is the average.
Packard Motor Car Co.	Market price.
Saxon Motor Car Corp.	According to ability.
Olympian Motors Co.	Based entirely on qualifications.
Briscoe Motor Corp.	Salary is specified after we have interviewed the applicant and determined for ourselves his ability.
Milburn Wagon Co.	Depends on applicant's experience and ability.
Continental Motor Corp.	Twenty-five cents an hour is the minimum.
The Auto Body Co.	Regulated by ability.
Master Carburetor Co.	Depends on position filled.
Detroit Lubricator Co.	Average rate for kind of work performed.

6—What are the qualifications essential to work in the accounting department?

Ford Motor Co.	Thorough knowledge of office work, good penmanship, strict application, honesty.
Buick Motor Co.	Mathematical accuracy, good penmanship, knowledge of operation of adding machine, neat appearance.
Chalmers Motor Co.	Bookkeeping and clerical experience.
Hudson Motor Co.	Mathematical experience and ability.
Saxon Motor Car Co.	Thorough knowledge of accounting and costs.
Olympian Motors Co.	General accounting experience.
Briscoe Motor Corp.	Applications for jobs in the accounting department should be made by letter to the assistant treasurer, giving him all details of experience.
Milburn Wagon Co.	Knowledge of the principles of at least bookkeeping; must be rapid; accurate at figures; must have an analytical mind that will enable one to see beyond whatever information is directly before him; must have the ability to compile statistics and graphs that will convey necessary information to his superiors in a logical and intelligent manner; also the ability to convey verbal information clearly and concisely.
Continental Motor Corp.	Must be clear headed, accurate at figures and persistent in following to a conclusion any line of accounts.
The Auto Body Co.	Knowledge of accounting.

MANY of the inquiries in the immense volume of letters Motor Age receives from readers are on the subject of this story—how to get a job in motordom. In these few pages an attempt is made to cover the field of job-hunting in the industry for the benefit of those who seek such employment. While all the makers are not represented here—it would be impossible to do so in one issue—this can be taken as a correct analysis of the situation and well might be considered an encyclopedia of its kind. If you are interested in employment by makers of motor cars or parts, keep it and use it. The diagram is that of the organization of the Chalmers Motor Co., and will give you some idea of the opportunity for jobs that exists in the industry.



Master Carburetor Co.	Experience in a position similar to that wanted. Record must show employment by one concern of considerable length of time.
Detroit Lubricator Co.	Accurate clerical experience. Personality is a factor.

7—What are the qualifications essential to work in the engineering department?

The engineering department comprises a chief engineer, assistant engineers, investigators, draftsmen, chemists and experimental engineers. This work calls for technical engineering knowledge and training.

The Ford Motor Co.	Technical training along lines followed, practical experience, initiative, and so forth.
Willys-Overland Co.	Previous drafting or engineering experience.
Buick Motor Co.	Mechanical drawing, mathematical ability, technical experience.
Chalmers Motor Co.	Drafting experience necessary. Technical experience desirable.
Hudson Motor Car Co.	This department requires draftsmen with considerable experience, chemists, designers, gas engine experts.
Saxon Motor Car Corp.	Technical training, practical experience to a greater or lesser degree.
Olympian Motors Co.	Experience required.
Milburn Wagon Co.	Drafting experience, general engineering knowledge, knowledge of materials, mathematics, technical education very desirable, but not essential; ability to think logically; inventiveness or originality.
Continental Motor Corp.	Being qualified as a practical draftsman and able to calculate distribution of stresses and strains and value of strength in material and practical application.
The Auto Body Co.	Must be draftsman, have motor car body-building experience.
Master Carburetor Co.	Technical education.
Detroit Lubricator Co.	Drafting and designing experience, speed and clerical exactness.

8—What are the qualifications essential to work in the experimental engineering department?

This department is comprised of engineers whose duties are along experimental lines. They experiment with all makes and models of cars to discover what advantages other cars possess which might be incorporated in their own cars and experiment with defective springs, defective ignition, etc., to determine the best way to overcome the faults of their car. This work demands a technical education and experience of high degree.

Ford Motor Co.	Long service, mechanical ability, honesty, technical and mechanical knowledge and established general dependability.
Willys-Overland Co.	No applications from outside considered.
Buick Motor Co.	Inventiveness, mechanical drawing ability, mathematical ability.
Chalmers Motor Co.	General mechanical and motor car experience.
Hudson Motor Car Co.	Technical college education.
Saxon Motor Car Corp.	Technical training and practical experience.
Olympian Motors Co.	Experience.
Milburn Wagon Co.	Technical education desirable but not essential. Must have wide shop knowledge and repairing experience.
Continental Motor Corp.	Practical knowledge of motor car construction.
Auto Body Co.	Must know drafting and body work generally.
Master Carburetor Co.	Technical education in its line.
Detroit Lubricator Co.	Technical and practical education preferably in the lines to be undertaken.

9—What are the qualifications essential to work in the production department?

This department, as mentioned before, comprises many divisions. The replies given by the various companies refer to the keeping of stocks of raw materials, the machinery layout and the mechanical work, much of which does not require a particular skill.

Ford Motor Co.	Machine shop experience preferred.
Willys-Overland Co.	No previous experience required.
Buick Motor Co.	No experience required but must be able to think and act and judge for yourself.
Chalmers Motor Co.	To possess experience in the particular line applied for.
Hudson Motor Car Co.	Depends on the line of work the applicant desires.
Saxon Motor Car Corp.	Mainly good health and ambition.
Olympian Motors Co.	Must have mechanical experience to get best wages.
Briscoe Motor Corp.	Experience in whatever line desired.
Milburn Wagon Co.	Knowledge of blue prints, good memory, initiative, ability to follow a task through to completion regardless of obstacles, grasp of details, content to hold minor position to become familiar with manufacturing, stick-to-itiveness, health.
Continental Motor Corp.	Health, good character, physical strength. Must be mentally capable of comprehending instructions and skillful in their application.
The Auto Body Co.	Knowledge of its business.
Master Carburetor Co.	Experience mechanically.
Detroit Lubricator Co.	Shop experience coupled with clerical experience.

10—What are the essentials required in the purchasing department?

Ford Motor Co.	Good clerical experience, penmanship, neatness, good address and ability to meet all classes of people.
Buick Motor Co.	Good judgment, initiative, good at figures and grammar and of neat appearance.
Chalmers Motor Co.	Knowledge of motor car parts, accounting or clerical experience.
Hudson Motor Car Co.	Any good, wide-awake young man can work in the purchasing department.
Olympian Motors Co.	Knowledge of sources of supplies, good business judgment and keenness.
Milburn Wagon Co.	Experience in purchasing department work desirable but not absolutely necessary. Should be accurate and quick with figures, however, and familiar with stock record work and also have some knowledge of bookkeeping to be able to handle the vouchering of invoices and make proper distribution to the different accounts.
Continental Motor Corp.	A capacity to realize current values and market conditions.
The Auto Body Co.	Knowledge of business and general ability.
Master Carburetor Co.	Experience in that line.
Detroit Lubricator Co.	Manufacturing experience and thorough understanding of product requirements, clerical exactness.

11—What are the qualifications essential to work in the traffic department?

Ford Motor Co.	Traffic experience, aggressiveness, clerical ability, honesty, etc.
Buick Motor Co.	Railroad geography and routing.
Chalmers Motor Co.	Freight and express rates, railroads, etc. Clerical and stenographic experience is helpful.
Hudson Motor Car Co.	Must have railroad experience.
Saxon Motor Car Corp.	Familiarity with railroad methods.
Olympian Motors Co.	Experience necessary.
Milburn Wagon Co.	Knowledge of rates, routes, handling of claims, interstate commerce law and rulings, classification of shipments, rates to apply, correct length of car to use on each carload shipped; keep in close touch with every other department.
Continental Motor Corp.	Knowledge of railroad methods and practices and freight schedules.
The Auto Body Co.	Must have traffic experience.
Detroit Lubricator Co.	Railroad experience, clerical, is valuable. Clerical exactness and training.

12—What are the qualifications essential to work in the shipping department?

Ford Motor Co.	Good wide-awake hustlers, not necessarily of any previous experience.
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Buick Motor Co.	Classification of freights and freight rates.
Chalmers Motor Co.	Clerical experience, knowledge of methods of handling freight and express shipments.
Hudson Motor Car Co.	Railroad experience.
Saxon Motor Car Corp.	Familiarity with railroad methods.
Olympian Motors Co.	Ambition and experience preferably, but experience not absolutely necessary.
Milburn Wagon Co.	A thorough knowledge of routes, ability to obtain equipment to move goods when ready, general knowledge of classification, knowledge of railway requirements as to packing goods for domestic and export shipment, ability to follow orders through until shipped.
Continental Motor Corp.	Knowledge of railroad methods and practices and freight schedules.
The Auto Body Co.	Accuracy, hustle and knowledge of traffic.
Master Carburetor Co.	Honesty and ability to follow orders carefully.
Detroit Lubricator Co.	Physical fitness and clerical exactness.

13—How can I get to be a factory tester?

Ford Motor Co.	By working along lines leading to that end, such as repairing, etc., and by strict application to whatever duties set at.
Willys-Overland Co.	All-round mechanics only considered.
Chalmers Motor Co.	The testers must have experience in driving, tuning motors, general repair work, etc.
Hudson Motor Car Co.	By working as a tester helper or handy man in test department.
Packard Motor Car Co.	By thorough training and through promotion.
Saxon Motor Car Co.	Must first have full knowledge of gasoline engine.
Olympian Motors Co.	Must apply in person.
Briscoe Motor Corp.	Must be experienced drivers and have a very thorough knowledge of the construction of the car.
Milburn Wagon Co.	Experience in all branches of motor car work necessary. If applicant qualifies, he is assigned to testing immediately. If not, must be trained.
Continental Motor Corp.	Start as a helper.
Master Carburetor Co.	By proving ability in that line.
Detroit Lubricator Co.	Experience and education.

14—What are the qualifications essential to road testing work?

Willys-Overland Co.	Thorough motor car mechanic.
Buick Motor Co.	Must be thoroughly familiar with engine and starter troubles and be careful.
Chalmers Motor Co.	Knowledge of gasoline engine, carburetor, ignition and driving experience.
Hudson Motor Car Co.	Must be good driver and repair man.
Packard Motor Car Co.	A thorough knowledge of the work and driving experience.
Olympian Motors Co.	Experience necessary.
Briscoe Motor Corp.	These men generally are transferred from some other portion of factories.
Milburn Wagon Co.	A thorough knowledge of all mechanical parts of the car.
Detroit Lubricator Co.	Education in that branch of the trade.

15—What are the qualifications essential to work in the sales department?

This question applies only to employment as salesmen either in a branch or agency or the main sales offices.

Ford Motor Co.	Thorough knowledge of the article to be sold, good address, courtesy, honesty, general dependability, etc.
Buick Motor Co.	Good appearance, pleasing manner and knowledge of the principles of selling—a good mixer.
Chalmers Motor Co.	Sales ability and general motor car experience, stenographic or clerical experience.

Hudson Motor Car Co.	Must know all about a car, have neat appearance and a good personality.
Saxon Motor Car Corp.	Sales ability, diplomacy and a good judgment of human nature.
Olympian Motors Co.	Natural salesman, preferably with motor car experience.
Milburn Wagon Co.	Enthusiasm.
Continental Motor Corp.	Ability to close deals.
Master Carburetor Co.	Knowledge of salesmanship. Must know about carburetors and ignition.

16—What are the essential qualifications to work in the advertising department?

This is the department which cares for the writing and placing of advertising, house organs and so forth.

Ford Motor Co.	Knowledge in advertising lines, experience, and alertness.
Buick Motor Co.	Good knowledge of the English language and grammar, principles of selling, printing and engraving methods also valuable.
Chalmers Motor Co.	Experience along the following lines is helpful, newspaper, stenographic, clerical and general business.
Hudson Motor Car Co.	Must have experience.
Olympian Motors Co.	Advertising and motor car experience.

17—What are the qualifications essential to work in the service department?

This is a section of the sales department, and in many concerns the employment of men for this division is made by the sales department, while in others it is handled by the employment. Service departments are maintained by factories to supply parts and making repairs and adjustments for car owners and car dealers.

Ford Motor Co.	General knowledge of the Ford car is necessary, with repair and parts knowledge and clerical ability. Apply to employment superintendent.
Willys-Overland Co.	Apply to L. A. Miller, office manager.
Buick Motor Co.	Must be thoroughly familiar with engine and starter troubles and must be careful worker.
Chalmers Motor Co.	General motor car experience.
Hudson Motor Car Co.	Must be good mechanic and correspondent.
Saxon Motor Car Corp.	Must be engine builder and clerical.
Olympian Motors Co.	Clerical and mechanical.
Briscoe Motor Corp.	Must be first-class repair man, have own tools and must know courtesy and respect, since much of this work is done with our customers.
Milburn Wagon Co.	Diplomacy or tact in handling people, thoroughness, ability to devise temporary repairs if needed. Road service men are taken usually.
Continental Motor Corp.	Knowledge of service work and training.
Master Carburetor Co.	Knowledge of carburetors and ignition.
Detroit Lubricator Co.	Gasoline engine education and knowledge of ignition.

18—How can I become a factory racing driver? How can I get on a factory racing team?

Very few of the motor car makers are operating racing teams now. Those who do are extremely careful and particular about the men they employ and prefer individuals who already have attained a reputation or have long mechanical experience. For example, the Hudson Motor Car Co., which is one of the very few companies operating racing teams, states that it employs only such men for racing work who are expert mechanics and that all other applicants have no chance whatsoever. It requires at least four years to become an expert mechanic. The same applies to racing drivers. Only racing drivers of reputation or men who have gained experience working with racing drivers are employed.







The Motor Car Repair Shop

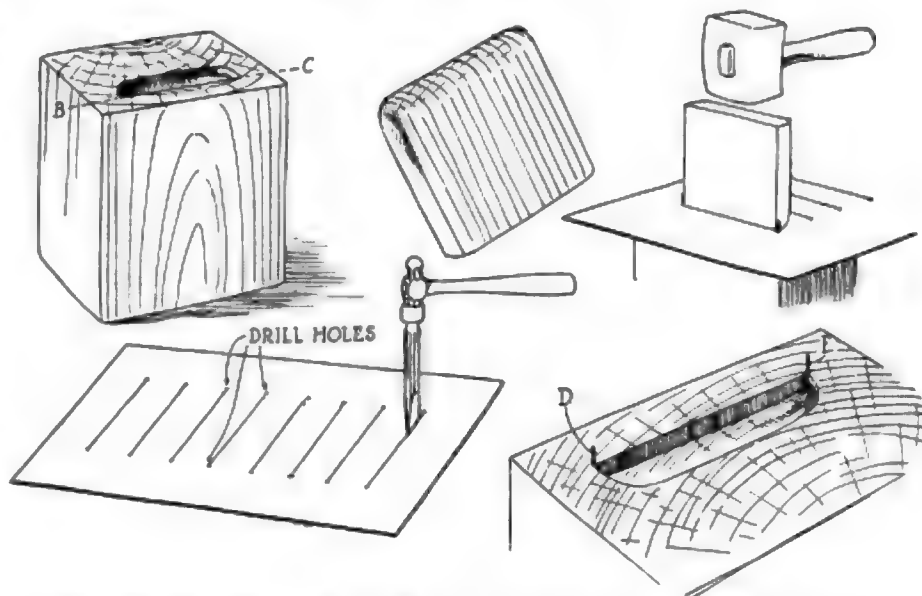


Cutting Louvres in Engine Bonnet

ALTHOUGH all cars are not fitted with louvres in the bonnet over the engine, it is sometimes desirable to so equip the car. There is an instrument on the market which cuts these louvres or openings very easily, but the repair man in a small town is not always equipped with special tools of this kind and must resort to other methods. A scheme for this is shown in the accompanying illustration and the tools and other apparatus used are those to be found around any shop. The part requiring the greatest work and accuracy is the cutting out of the wood block to the size and shape of the desired opening in the bonnet. It is best to cut this in the end grain of the block, the latter being large enough so it will not be split. A large chopping block is ideal for this, as it has the necessary rigidity. Cut the top of the block off square so it will have a perfectly flat surface and on this lay off the desired shape of the louvre. With chisel and gouge scoop out the wood to a depth corresponding to the size of the opening in the louvre. The corners of the recess can be rounded with the gouge. The next thing to make is the other part of the wood die, which consists of the hard wood block A, having the same thickness as the width of the cut in the chopping block. The grain in the block A should run as shown and the end which fits in the recess shaped so it will be an exact reverse of the latter, fitting it snugly. By taking off a little here and there with a wood rasp, the block A can be made to fit exactly.

To Lay Off Louvres

The next step is to lay off the louvres in the sides of the bonnet, it being only necessary to draw a series of straight lines, corresponding to the length of the louvres. At each end of these lines drill a very small hole, which will be used to register the openings later on. With a sharp cold chisel cut the metal along the entire length of the lines previously drawn. When this has been done the side of the bonnet will present a series of slots and the next step is to place these slots upon the chopping block in such a way that they will each in turn coincide with the line B-C. This is made possible by driving in two thin brads D and E into the corners of the recess, as shown, cutting off the heads after they are in place. The holes which have been drilled in the ends of the slots in the bonnet fit over the nails D and E, thus making sure that all the openings will be cut uniform and parallel, provided the lines have been drawn parallel. Place the first slot in position on the block and line it up by the nails as before stated. Get a helper to



Shop tools with which louvres can be cut in the engine hood and method of doing so

hold the bonnet in this position and be sure that the metal lies flat on the wood. The block A is now placed above the slot, between the nails and in a vertical position. By striking the upper end of A a few sharp blows with a mallet, the louvre will be stamped out. The same procedure is carried out with all the slots, taking them in regular order. It is obviously necessary to cut the openings in regular order, as otherwise the raised portion of the louvre would prevent the metal from lying flat on the block.

After all the openings have been cut in this way, the ragged edges can be smoothed up with a file and emery cloth. If this smoothing up job is carefully done, the louvres will present a neat appearance and closely rival those stamped out in a press.

Protecting Spare Tires

Over one-half of the cars one sees carry spare tires that are not protected properly when they are strapped on the running board or carried on the rear of the car. In many instances they are carried without covering of any kind and are therefore subjected to dust, oil, mud and water, as well as the destructive influence of light. Perhaps the most serious thing is that water can collect in the spare tire, which will soon soak into the fabric and eventually ruin it. Dust may mix with this water and form a kind of mud which will harden on the inside of the casing. When the tire is used later on, it is very likely that this coating will not be rubbed off,

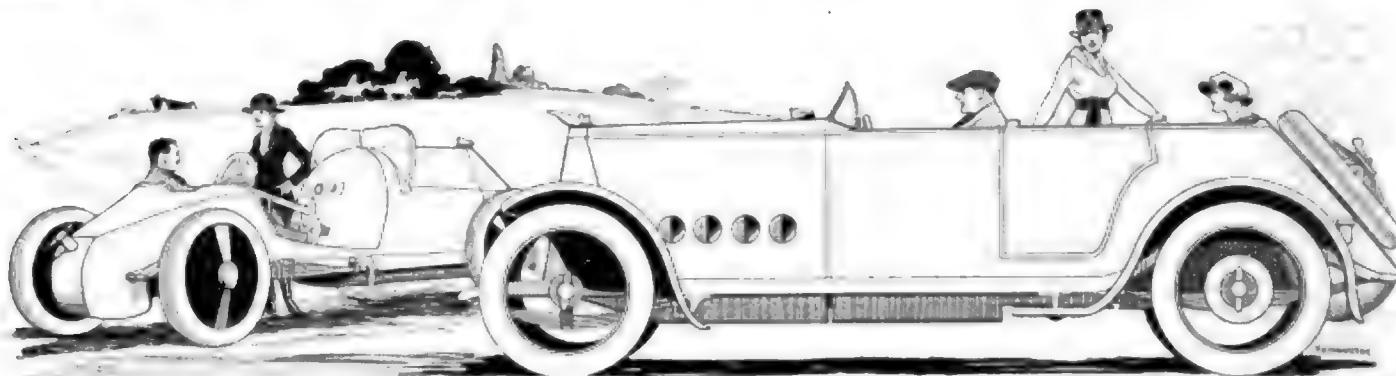
thus exposing a rough surface to the inner tube. This is bound to chafe the tube and the car owner wonders why the tube has given out.

There are many tire covers on the market and the cost of these is so small in comparison to the amount of good that they do, that one wonders why they are not more universally used. When spare tires are strapped to carriers, care should be taken to see that they are held tightly, otherwise they are likely to wear considerably due to the tossing about of the car.

Tire Seal Test

For three days a Buick six-cylinder car equipped with Kelly-Springfield Kant-Slip shoes underwent a test on the roads in the vicinity of New York with a new tire seal inside the inner tubes. The test was made by the Automobile Club of America and showed the compound, which is made by the Crow Levick Co. of Philadelphia, to cause no loss in air pressure during the actual driving time. An examination of the tubes showed the seal in every instance closed the holes made by a pen knife. A chemical test showed that outside of a small quantity of water in the compound there was nothing to shorten the life of the rubber. No decomposition had set in when the compound had been heated to 260 deg. F., which is the point at which it solidified. Oil had no effect, and it was easily washed from the surface of the car. The distance traveled in the test was 292.7 miles.

The Readers' Clearing House



By Kenworthy

Fig. 1—Two out-of-the-ordinary MOTOR AGE designs for a fast roadster and touring car. Note the novel shapes of the windshields

OVERHAULED ENGINE HAS A KNOCK May Be Caused by Improperly Fitted Piston Rings

HASTINGS, Iowa—Editor MOTOR AGE—I have just taken up the connecting rod bushings and crankshaft bearings from my car and installed non-leaking rings. The motor has a knock at regular intervals. Would it be caused by the new rings on account of improper seating, or is it due to bushings or valves being too tight? The rings have a notch to fit in a small pin in the grooves. Is it possible that they were not installed properly?—J. W. Dolph.

The knock you speak of may be caused by the new rings, or in reassembling the engine you may have gotten the bearings too tight. If the knock is like the tapping of a hammer upon a metallic surface, it is quite likely that the piston rings have not been properly fitted, or that they are not the correct size. For one thing if the ends of the rings are hard butted against one another when the pistons are in place in the cylinder, they may be buckled by expansion when heated.

When the rings are fitted into the grooves of the piston, care must be taken that each ring will be placed into the groove for which it has been previously prepared, either by lapping or grinding. While the rings and grooves look alike, there may be, nevertheless, a slight variation in them and for this reason each ring should be prepared for a particular groove. The ring should be first tried in the groove without slipping it over the piston, by rolling it around the grooves. It should fit snugly, as at B, but still be free to slide in and out easily.

At A is shown a case of improperly fitted piston rings, which are likely to set up a series of knocks when the engine is running. As will be noticed there is a space above each ring. When the piston is at the bottom of its stroke, this space will be at the bottom of the groove and as the piston ascends, the rings will be momentarily held stationary until the lower part of the groove will again pick them up and carry them to the top of the cylinder. On the downward stroke, the opposite takes place. This constant ham-

mering of the rings against the grooves of the piston will produce a distinct knock in the engine. The greater the space between the ring and groove, the louder will be the knock.

Another point to remember is that new rings should be given ample time to wear themselves in, plenty of oil being supplied to the engine. If an engine has been fitted with new rings which have not been properly stored, the latter may have become sprung and do not fit the cylinder correctly. In this case the high spots must be removed by grinding or lapping.

OPERATION OF MACOMBER ENGINE Valves Are Actuated in Turn from a Single Cam

Belle Plaine, Iowa—Editor MOTOR AGE—Kindly explain the working principles of the Eagle-Macomber rotary motor, made by the Eagle-Macomber Motor Co., Sandusky, O.

Inquiries Received and Communications Answered

J. W. Dolph.....	Hastings, Iowa
Oakey Schuchert....	Belle Plaine, Iowa
Herbert Smeed.....	Walterville, Ore.
William Hein.....	Ansley, Neb.
W. L. Redmon.....	Tipton, Mo.
G. H. Kohrt.....	Coleraine, Minn.
H. W. Bacon.....	Whittier, Cal.
J. W. Guy.....	Columbus, Ohio
H. G. Doncey.....	Perry, Okla.
C. F. Allen.....	Doniphan, Mo.
A. L. Gray.....	Ottawa, Kan.
C. Zinkan.....	Indianapolis, Ind.

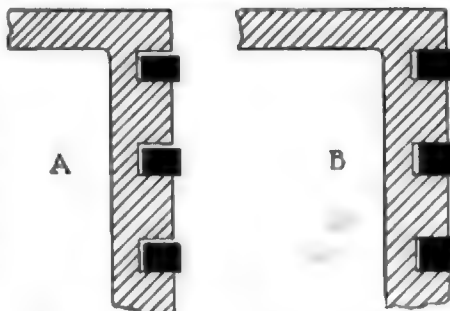


Fig. 2—Correct and incorrect way of fitting piston rings

- 2—Has this motor proven a success by test?
- 3—How many r. p. m. will it turn?
- 4—Will it furnish power as steady as steam?
- 5—Will this motor be used very extensively in pleasure cars?
- 6—How many horsepower will a Metz 34 by 4 develop on the belt with an 8-inch pulley?
- 7—Would this motor give satisfaction as regards power?
- 8—How many r.p.m. will it turn?—Oakey Schuchert.

1—The Macomber engine is built with either five or any odd number of cylinders, arranged around the main shaft with all parts identically alike, so that the one cam which is provided actuates all the valves in succession and one ignition ring serves for firing all the cylinders. The pistons in this engine are of the conventional type, but the connecting rods are quite different. The latter resemble elongated dumb-bells, one end fitting into a socket in the piston and the other into a socket in what is called the angle plate. The angle plate is disk-shaped and inclined at an angle to the horizontal axis of the engine. The amount of this inclination corresponds to the length of the piston stroke. Thus when the cylinder on top is compressing a charge, which, at the end of its stroke is fired in the usual manner by a spark plug, then, when the explosion occurs the pressure between the cylinder and piston tends to force the piston back. This force acting through the angle between the plate and the cylinder bases tends to force the angle plate around. Inasmuch as the cylinders and angle plate are geared together, the effect of this impulse is to revolve the entire engine on its ball bearings. The pressure from the ignited gases continues this pushing action until the cylinder has reached the bottom of the swing, when the exhaust valve is opened. The next upstroke of the piston forces out the burnt charge and when this same cylinder is again at the top of the swing, it has been cleared for drawing in a fresh charge.

The valves are located in the head of each cylinder and operated by rockers from a single cam, there being no push rods. The gas travel has been shortened in this engine by mounting the carburetor on the end of the engine supporting shaft. The



it will be necessary to do one of two things, either increase the number of paths through the armature winding or increase the size of wire used in winding the armature. In order to increase the number of paths through the armature winding, it will be necessary to reconnect the armature winding to the commutator segments. No general rule can be given for the procedure in making this reconnection as the details of the present winding must be known in order to determine what changes may be made. Thus if the winding is now what is called a simplex series winding there are two circuits, or the value of b is 2, and it may be changed to a duplex series winding, or a simplex doubly reentrant winding, not always, however, in which cases there will be four circuits, the value of b being 4. In changing the winding so that there are more circuits, the value of the electrical pressure generated in the winding will be reduced, as may be readily seen by an inspection of the above equation. Thus, if the value of b which occurs in the denominator of the expression for the value of the generated voltage is doubled and all the other quantities in the expression remain constant in value then the value of the generated voltage will be reduced to one-half of its previous value. This reduced voltage multiplied by the increased current capacity will give the same wattage capacity, however.

In changing the current capacity of the armature by winding it with larger wire the voltage will be reduced, as you will be unable to get as many turns of the large wire on the armature as there were turns

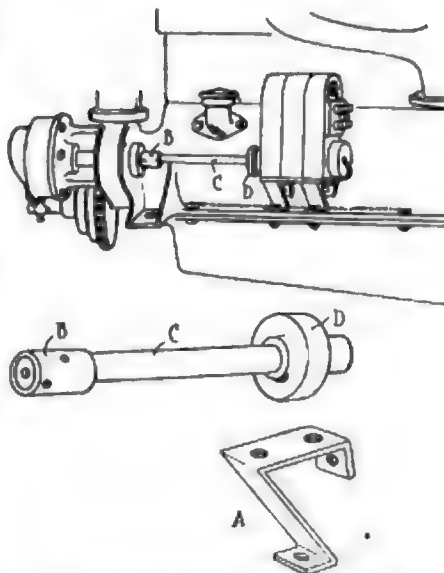


Fig. 5—Method of installing magneto on Studebaker

of small wire. If the turns be reduced the value of Z will be reduced, which accounts for the reduction in the value of the generated voltage. You can now readily see how difficult it is and in fact impossible for us to give you any definite information as to what changes you should make. The easiest way for you to make the changes will be to change the size of wire and put on less turns, making the connections just as they are now. A careful record and diagram should be made of these connections while you are removing the old winding.

Increasing Speed and Voltage

Increasing the speed of the armature from 1800 to 2400 r.p.m. will cause a corresponding increase in generated voltage, assuming all other quantities in the above equation remain unchanged. If the field winding is connected to the terminals of the machine there will be a change in the value of the current in this winding due to any change in the value of the pressure between the brushes and hence a change in the magnetic lines ϕ per pole. If the voltage between the brushes be reduced to approximately one-half of its present value the field coils, assuming there are two of them, may be connected in parallel instead of in series, as they are no doubt now connected.

2—The use of the resistance units will depend upon the voltage of the source of current. Thus if a voltage of 12 volts is available then four of these 6.4-ohm resistances connected in parallel and to the source of pressure will permit a total current of 12 divided by 1.6, or 7.5 amp., to flow. The four 6.4 ohm resistances will have a total resistance of 1.6 ohm when they are connected in parallel.

In charging a 6-volt battery from a 110-volt direct-current circuit it will be necessary to have a resistance of such a value in circuit that the drop over this resistance when it is carrying the desired charging

current will be equal to the difference between the pressure of the source and the pressure of the battery. The pressure of a 6-volt battery when it is charging is about 7.5 volts, so that the voltage over the resistance will be equal to $110 - 7.5$, or 102.5 volts. Now if a single one of the 6.4-ohm resistances be connected in series with the battery, this 102.5 volts pressure will produce a current of 102.5 divided by 6.4, or 16.0 amp., which is greater than the capacity of the resistance. Two of the resistances in series with the battery will result in a current of 102.5 divided by 12.8, or 8.0 amp., which is also greater than the capacity of the resistance. Three resistance in series with the battery will result in a current of 102.5 divided by 19.2, or 5.34 amp., which the resistance will no doubt safely carry.

The above method of charging a battery is very inefficient, as such a large part of the total electrical energy delivered by the source is used in heating the resistance in series with the battery rather than producing a reversed chemical action or charging a battery. The efficiency may be improved by connecting more batteries in series and thus reducing the resistance required in order to limit the value of the current. For example, if ten batteries were connected in series then the voltage of the combination while charging would be approximately 10 by 7.5 or 75 volts, and the drop over the resistance would be $110 - 75$, or 35 volts. A single resistance of 6.4 ohms in circuit would allow a current of 35 divided by 6.4, or 5.47 amp., to flow. Two resistances in parallel would give a total current under the above conditions of approximately 10.94 amp.

Wiring Diagram on Michigan 40

Ottawa, Kan.—Editor Motor Age—Publish a circuit diagram of North East electric system, showing the motor generator circuits as used on the 1913 model Michigan 40?—A. L. Gray.

The diagram is shown in Fig. 8. This

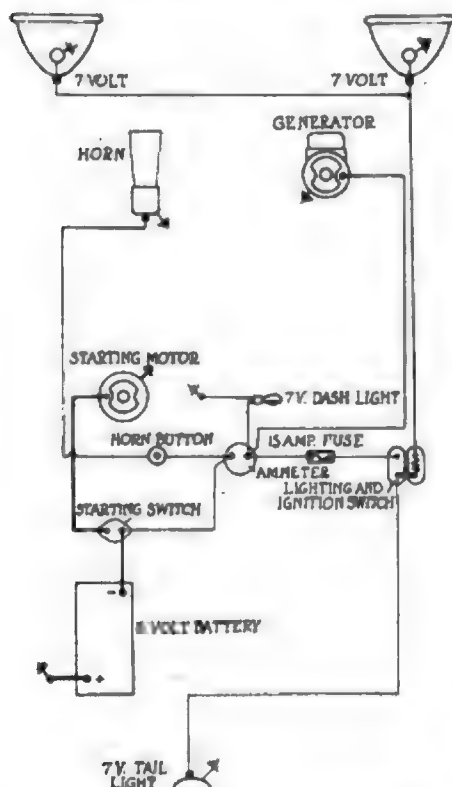


Fig. 6—Starting and lighting system used on Emerson

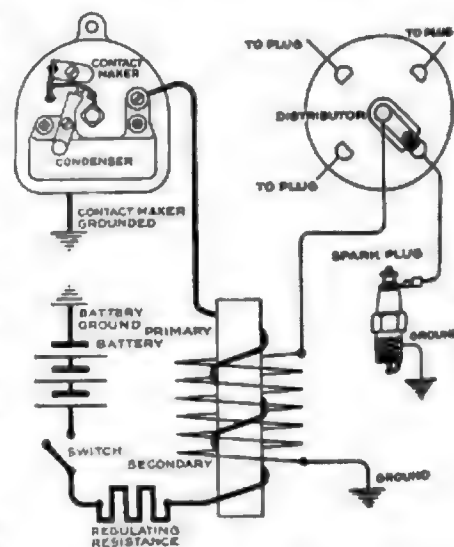


Fig. 7—Atwater Kent system of Emerson four

shows the earlier type of North East system such as was installed in the 1913 Michigan. In some of these the polarity was not marked, and there was some chance of getting the battery and motor-generator connected wrong. The wire leading from the positive terminal of the battery must be connected to terminal No. 1 on the motor-generator and No. 1 on the starting switch. Also the wire from the negative battery terminal must be connected to terminal No. 3 on the motor-generator. If these wires are reversed the battery will be discharged.

STUDEBAKER CLOVER LEAF BODY Can Install Magneto in Powerplant of This Motor Car

Tipton, Mo.—Editor MOTOR AGE—My car is a 1917 Studebaker seven passenger. Where can I get a four passenger clover leaf body, as the rear seat of my car hasn't enough room.

2—What would be probable price?

3—Can I install a magneto in this power plant? If so, explain how.

4—Can the final drive be changed from bevel to spiral bevel? If so, what would be approximate cost?—William L. Redmon.

1—You would probably have to have a body built to order.

2—This would depend on how elaborate a finish the body had.

3—A magneto can be installed on the pump side of the engine, but it will be necessary to build a special platform for the magneto. A suggestion for this is shown in Fig. 5. First the boss on the pump drive gear casing must be cut so that the shaft will project through a short distance. To mount the magneto, two brackets, A, are made out of strap iron and bent to the shape shown. The brackets are held in place by bolts passing through the crankcase joint and into the upper half of the crankcase. Holes must be bored into the latter and tapped to fit the cap screws. The latter should be about $\frac{1}{4}$ or $\frac{3}{8}$ in. To connect the magneto with the pump gear a sleeve, B, is made, the hole in it being of such size that it will just slip over the gear shaft. To make it possible for the sleeve to turn with the shaft, a hole is drilled through both of them and a small pin inserted. Similarly a pin is used to fasten the sleeve and shaft C in place. At D is shown a conventional form of magneto coupling, which will take up any irregularity in the drive. The latter also makes it possible to time the magneto properly.

4—Yes, but the expense would not warrant the change, inasmuch as the company is not in position to furnish this form of drive and you would have to have these gears cut specially.

WIRING ON EMERSON FOUR CAR Possible to Connect Ammeter and Dash Lamp Into Circuit

Coleraine, Minn.—Editor MOTOR AGE—Kindly give a diagram of the Atwater-Kent ignition system—one point distributor, as installed on the Emerson four.

2—Can a dash lamp be connected to this system? If so, what size?

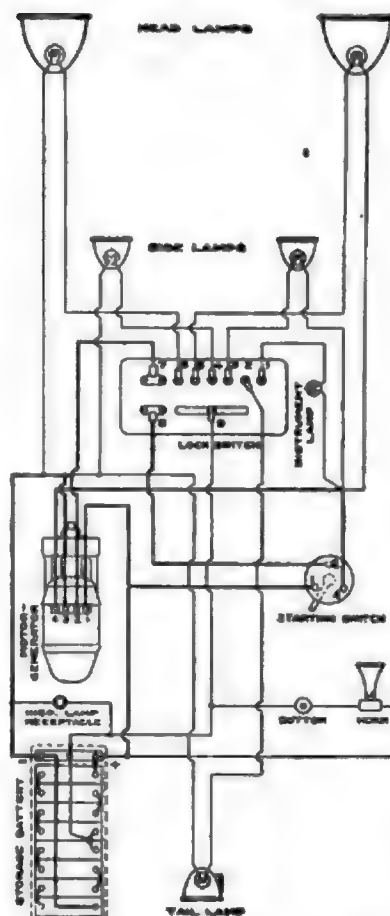


Fig. 8—Wiring diagram used on Michigan car

3—Could an ammeter be installed on the dash to show when the generator is charging and when not?

4—On the above named system, if the generator should be out of order, could the car be run from the current from the battery or vice-versa?

5—Would it be advisable in this system to carry dry cells? If so, how many and how should these be connected?

6—Kindly explain the Apple starting system which is being used on the Emerson Four.—G. H. Kohrt.

1—This diagram is shown in Fig. 7.

2—Yes. As shown in the diagram.

3—Yes. The method of connecting the ammeter is shown.

4—Yes. If the battery becomes discharged, or otherwise got out of order, the starting motor could not be used and the car would have to be cranked. After that

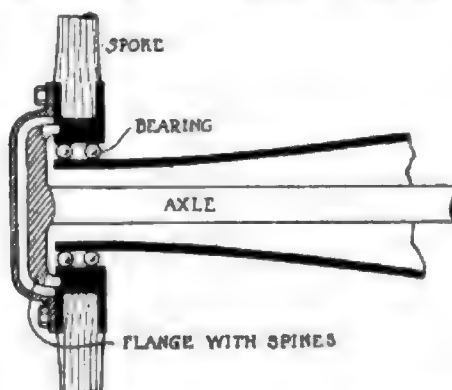


Fig. 9—Types of axles in general use, the first illustration showing a full-floating and the other a semi-floating

the generator would supply current for running.

5—No.

6—The starting motor receives its energy from the storage battery and cranks the engine until it starts running under its own power. The starter unit consists of three principal parts; the field, which is stationary, the armature which revolves within the field and the automatic pinion shift. The latter is the connecting link between the starting motor and the flywheel of the engine. One end of the motor shaft carries a weighted pinion which automatically engages with the teeth on the rim of the flywheel when the starter pedal is pressed and cranks the engine, the current being supplied from the storage battery.

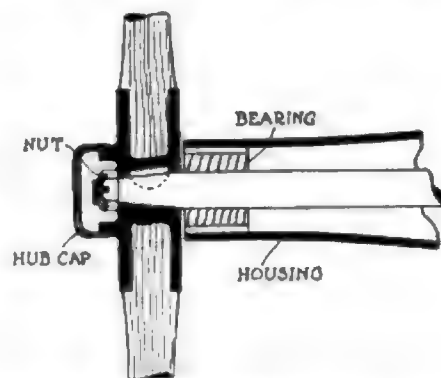
The generating unit is mechanically driven by the engine and generates the current which is utilized for charging the storage battery and lighting the lamps. The moving part of the generator consists of a shaft on which the armature is mounted and rotates with it. The armature consists of a number of separate electric windings, each of which is connected to its own section of the commutator. The latter is a cylinder made up of insulated copper sections, and is accessible by removing the band at the front of the generator. The armature rotates between two separate windings on soft iron cores, which form electro-magnets and are called fields. When a current passes through the field windings, the field becomes energized and the rotation of the armature between them sets up an electric current in the armature windings, being then discharged through the commutator into the carbon brushes and finally to the storage battery.

DISTINGUISHING TYPES OF AXLES

How Novice Can Tell the Full-Floating from Others

Perry, Okla.—Editor MOTOR AGE—How can a novice tell a full-floating rear axle from the other types?—H. G. Doncey.

There are three types of live rear axles in ordinary motor car nomenclature, known as the full-floating, semi-floating and three-quarter floating types. Live axles are those that turn with the wheels, while dead axles are those used on chain-



drive cars, where each rear wheel is connected to the countershaft sprockets with a chain. The axle in this case stands still as the wheels revolve.

As the name implies, the floating axle is one that floats. That is to say no weight is carried by the axle shaft, all of the weight being taken by the axle housing. The sole function of the axle shaft is to revolve and turn the wheel attached to it. The semi-floating axle, however, not only turns the road wheels but takes some of the weight of the car also. The essential difference of these two types is in the position of the wheel bearings. In Fig. 9 is shown a full-floating axle, and reference to this will show that the wheel bearings are placed on the outside of the housing. The rear wheels of the car rest upon these bearings. Obviously if the wheels rest upon the bearings and the latter in turn rest upon the housing, the housing must support the entire weight of the car. The end of the axle shaft has some form of jaw clutch which fits into depressions in the wheel hub. Thus when the axle shaft turns, the wheel must turn also. In the floating axle this connection is flexible, but in the three-quarter floating type the end of the shaft is attached permanently to the wheel, usually by means of bolts.

In Fig. 9 is shown a semi-floating type of rear axle, and here it will be noted the bearing for the wheel is placed in the inside of the housing, instead of on the outside. The wheel is placed on the axle shaft and held in place by a key and nut. The latter is used to prevent the wheel from backing off, the nuts being locked with cotter pins.

The three-quarter floating type of axle is exactly like the full-floating, with the exception that the method of securing the axle to the wheel is somewhat different. As before stated, in the floating type the joint between the wheel and axle shaft is flexible, while in the three-quarter type the shaft is attached rigidly. The latter type has all the advantages of the full-floating but has the disadvantage in that the shafts are subjected to additional end stresses due to side slipping, etc.

You always can tell a full-floating type of axle from the semi-floating by the fact that in the former the drive axle can be removed by taking off the hub cap and

pulling out the shaft. This can be done without removing the wheels, which will hold up the car whether the axle shafts are in place or not. By jacking up the car to take the weight from the wheels, the wheel may be drawn off the housing.

Converting Metz for High Speed

Courtland, Ala.—Editor *MOTOR AGE*—How can I convert my Metz speedster for high speed work? Is there any way to substitute a rear axle and transmission for the present drive? If so, what type would be best and what would be the approximate cost?

2—Could a Ford transmission and rear axle be used by using the Ford crankcase?

3—This car is to be used on a half-mile track. What would be the best gearing?—Wm. Sherrod.

1—In converting any car for high speed work, providing the car allows it, there are many things which can be done to increase the speed. For one thing the gear ratio can be changed; light reciprocating parts installed in the engine; ignition set ahead and a larger carburetor fitted. The valves can also be given a greater lift and their diameter increased. If you are equipped to do the work yourself, you may be able to change the friction drive and install a different rear axle, but we know from experience it will mean a lot of work. If you will have to have the work done by some shop the expense of changing the car to a gear driven machine would hardly be advisable.

2—If you use this much of the Ford mechanism you may as well use the cylinder block of the Ford also.

3—About 2% to 1 or 3 to 1.

Engine Overheats

Bluford, Ill.—Editor *MOTOR AGE*—What is the cause of the engine on my 1917 Chevrolet 490 overheating? The ignition is exact, and the engine is free from carbon. It has a Zenith carburetor and engine idles down good and runs good, but it will boil the water in a 3-mile run. I have put in new hose connections.—Rolla F. Maxey.

Granting that the water is circulating through the cylinders properly, a number of reasons may be advanced for the engine overheating. Carbon is a very common source of overheating. The presence of this element in the cylinders in undue amount will cause pre-ignition, which in turn will heat the engine. This will be accompanied by a loss of power. Too rich a mixture is another common source of an engine becoming too hot. See that the

carburetor is properly adjusted and that the fuel valve is seating. The oil level in the crankcase should be watched and neither too much nor too little oil supplied. Also disconnect the muffler and if the boiling ceases, it would then show that the muffler is choked and causes back pressure. These are some of the more common sources of overheating. *MOTOR AGE* also suggests that you examine the fan belt for slippage. Sometimes, too, the rod which regulates the spark shifts out of position, so that the engine seems to be running with the spark advanced properly, whereas it may be in the retarded position.

Loose Bearing on Ford

Hillsdale, Mich.—Editor *MOTOR AGE*—What is the probable cause of the rear crankshaft bearing on a Ford 1916 touring car becoming loose? I have thoroughly overhauled the car and it seems in good shape. One mechanic informs me he had trouble of the same kind and that the crankshaft with magneto and transmission was found to be out of line, which, when corrected, remedied the trouble. Do you think this is the trouble with mine?—L. H. Norris.

Indications are that the bearing was not put back properly when the engine was re-assembled. There is a possibility that the crankshaft at the bearing point may have become worn out of round, or in other words, is over in cross section. If the bearing cap was fitted and tightened when the major axis of the oval section of the crankshaft was in a vertical position it would be somewhat looser when the crankshaft was turned a quarter turn. This might allow the retaining bolts to work loose, thus letting the bearing cap down and loosening the bearing. We do not think it probable that the crankshaft was out of line to such an extent that it would loosen the bearing.

Wishes Position in Factory

Columbus, O.—Editor *MOTOR AGE*—Where can I get information as to a position in a Michigan automobile factory either in the assembly or test?

2—Does a 16-valve cylinder head on a Ford use more gasoline than the regular valve?

3—Where do the present day race drivers get their start?

4—Is "Cannonball Baker," the endurance racer, the same man who raced motorcycles in 1912 for the Indian people?

5—Is the Hudson taking on racers for their teams?—J. W. Guy.

1—Write to the employment department of the factories.

2—No.

3—A great many started as testers for motor car concerns. Others have followed the racing game out of sheer sport usually financing themselves. Many drivers, in fact, the majority, started out as mechanics, being ultimately graduated into the ranks of the pilots of high-speed cars.

4—Yes.

5—No.

Converting a Marmon 32

Indianapolis, Ind.—Editor *MOTOR AGE*—Publish a sketch showing a Marmon 32 touring car converted into a speedster or a semi-speedster something like the model 32 Oakland shown on page 42 of your May 31 issue.—C. Zinkan.

A suggestion for this is shown in Fig. 11.

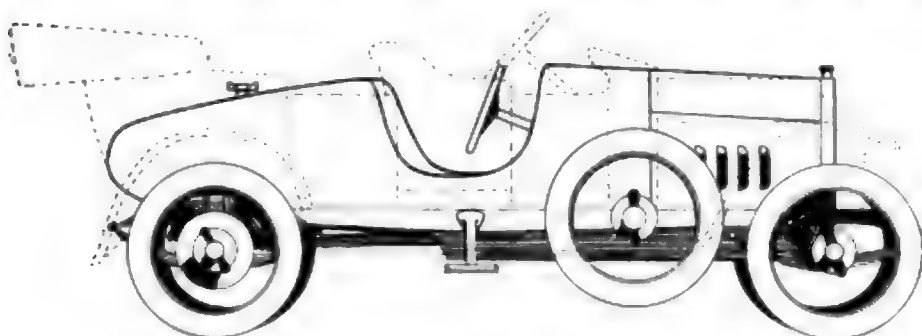


Fig. 11—Suggestion for converting Marmon 32 four-passenger into speedster









The Accessory Corner



Harward Piston Ring

THE Harward Mfg. Co., 3939 Magnolia avenue, St. Louis, Mo., is manufacturing a unique piston ring of one-piece construction. The inter-locking members of the joint engage in such a manner that no opening will occur in any direction, thus making compression positive and helping to keep the oil from entering the combustion chamber. Two rows of patented oil pockets are cut into the outside surface of the Harward ring for receiving and distributing excess oil, which would otherwise pass upward into the combustion chamber. The heavy film of oil retained in these pockets also helps to secure high compression and at the same time helps to give the ring flexibility, due to the material cut away in making these pockets.

Flaglite Flag Holder

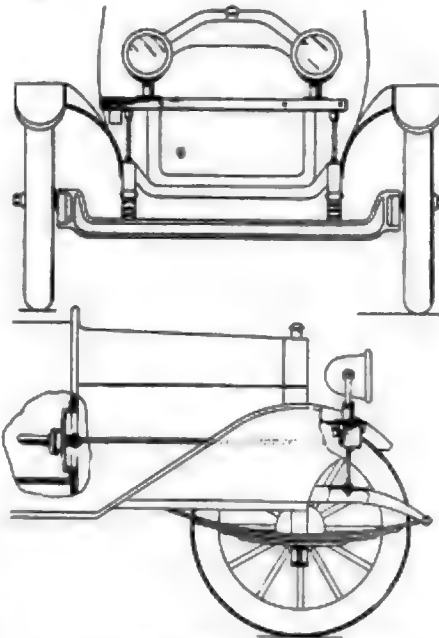
The Flaglite, which attaches to the radiator filler, serves to hold a silk American flag, and to illuminate it at night. In addition it serves a useful purpose in that it illuminates the motometer and may also be used as an inspection lamp. It is substantially made, both as to the reflector, which is designed on the principle of the Flood Light used to illuminate large areas effectively, and the wiring connections. It can be attached in 5 min. and becomes a permanent, useful adjunct. The lamp is made of brass silver plated inside and outside and the bracket, adjustable to various sized fillers, is cold rolled steel with a baked-on hard rubber finish. The flag staff is screwed into a receptacle over the reflector. A silk flag accompanies the outfit. The complete outfit sells for \$2. The Flaglite Co., Cleveland, Ohio.

Langellier Vertical Tapping Machine

A vertical tapping machine of bench and floor type of capacity for tapping $\frac{1}{4}$ in. in brass, and $\frac{3}{8}$ in. in steel, recently placed on the market by the Langellier Mfg. Co., Providence, R. I., embodies several useful features of construction. One feature is an automatic reversing mechanism which causes the tapping spindle to instantly reverse in direction of rotation at a pre-determined depth, without depending in any way upon the resistance to the tap to effect the reverse.

The spindle is floating and double-splined for correct balance at high rotative speed. The tapping spindle may be brought down and engaged into the work by depressing the foot treadle provided for the purpose, and a continuation of the tap penetration accomplished by continuing the pressure or by lowering the hand feed lever.

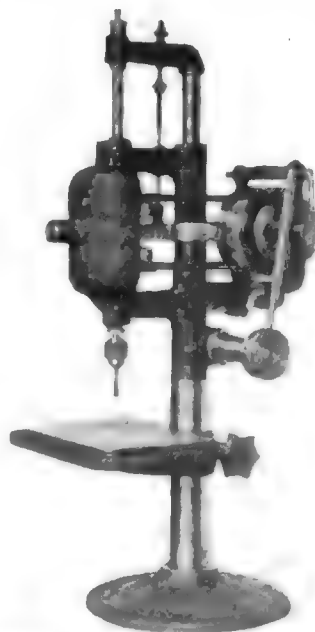
The adjustable table is of ample proportions to hold ordinary sizes of jigs or work.



Front and side views of Beach Dirigible Headlight



Harward piston ring of one-piece construction



Langellier vertical tapping machine of bench and floor type

The working face of this table is planned true and square with the spindle and has an oil rim on all four sides. The space occupied on the bench is $15\frac{1}{2}$ by 10 in., and the net weight is 240 lbs.

The Superspark

This is an auxiliary spark gap that is placed in the spark plug circuit for the purpose of intensifying the spark. It is attached to the terminal of each plug on the engine; the secondaries being attached to the terminals of their respective gaps. The effect of the gap is to increase the voltage, and decrease the ampere of the spark, eliminating spark plug troubles, it is said. Price, \$2 each. SuperSpark Co., 1330 Majestic Bldg., Detroit.

Stewart & Co. Specialties

Stewart & Co., 200 Broadway, New York, making a specialty of motor car hardware market a belt-driven valve grinder called the Nasco. This grinder consists of the grinder stand proper with one 5-in. wheel, complete with all attachments, one reamer handle, five pilots and four reamers. The price of the complete set is \$30. The company also sells the Victor round belt coupling in sizes from $\frac{1}{4}$ to $\frac{3}{4}$ in. The price of these ranges from \$2 to \$7.50 a dozen. Another belt coupling marketed is the Toscot, intended for flat belts, ranging in price from 90 cents to \$1.10 a dozen for the motor car sizes. Standard valve grinding compound is put up in convenient 4-oz., double, screw cover boxes, containing two grades. The coarse grade is for quickly cutting out the pits and roughness, while the fine is for finishing the valve and seat. The price is 40 cents. Ozigene, another product handled by this concern, is a preparation to be put into the gasoline tank to facilitate combustion. More mileage and elimination of carbon is claimed by the use of Ozigene. Fifty gallons of gasoline can be treated with 5 oz. of the fluid, which sells for \$1.

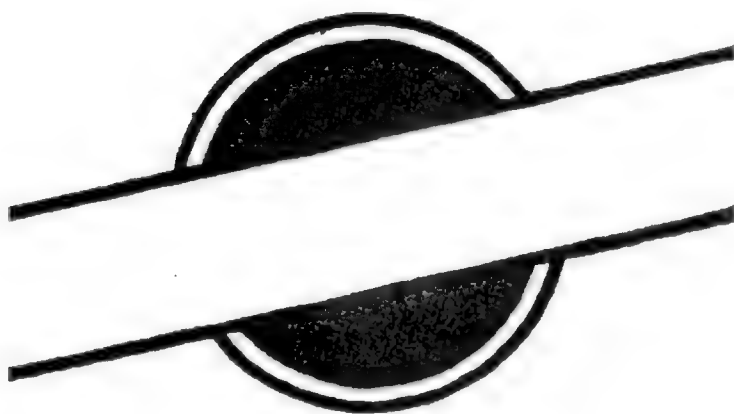
Pimbley's Auto-Newer

This consists of a preparation to bring back the luster to all exterior varnished surfaces on motor cars, etc. It does not add to the coating, but simply removes the streaks, or bluish almost imperceptible coating that obscures the finish. After application, when the preparation is rubbed dry and hard, the original luster will be brought back. It is claimed that this preparation contains no ingredients which might have a destructive effect on the finish of the car, and can be applied as often as needed. The preparation is applied by dampening one end of a piece of cheese cloth, and rubbing it on the body. If







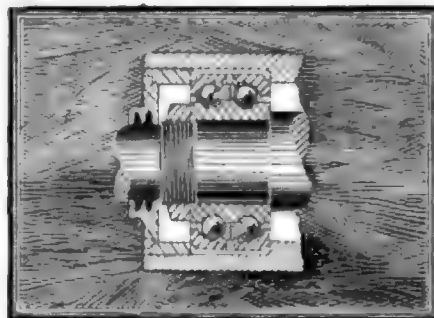
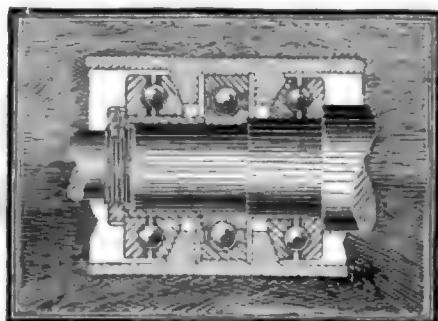


Next Week

in this publication, one of the best known and most successful manufacturers of passenger cars and one-ton trucks selling under \$800, will make an announcement of PROFIT-MAKING significance to every dealer and distributor in this business who is looking for a broader, more productive field in which to capitalize *fully* his merchandising ability.

Watch for this announcement.

For advance information wire or write MOTOR AGE, 95 West Fort St., Detroit, Michigan. Inquiries marked "Confidential" will be answered direct by MOTOR AGE and so treated.



Here is economy — added efficiency too. Compare these installations and understand why the New Departure Double Row Ball Bearing has revolutionized ball bearing practice.

Compare the cost of bearings. The Double Row is obviously less expensive than the other three bearings.

Compare the cost of housings. The thrust washers must have spherical seats while the Single Row must be carefully fitted so as to "float." The Double Row housing need only be machined as for a conventional Single Row.

Compare the space occupied; less than half for the Double Row, an important consideration in many designs.

Compare the capacity. The Double Row resists an equal amount of thrust and from $\frac{1}{3}$ to $\frac{1}{2}$ more radial load.

Compare the adjustment. The Double Row is always in correct adjustment while it is difficult to maintain a correct adjustment and alignment with three bearing units.

Compare the action. You have true rolling motion at all times in the Double Row. Thrust washers are admittedly limited to low speed ranges.

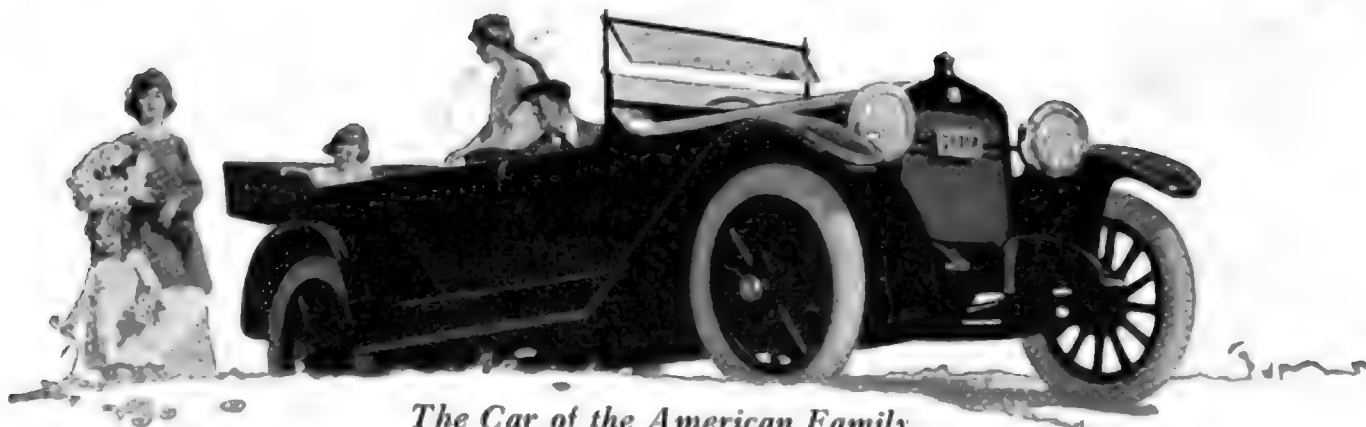
THE NEW DEPARTURE MFG. COMPANY, BRISTOL, CONN.

NEW DEPARTURE
BALL BEARINGS









The Car of the American Family

A National Reputation Made International

We believe the Hupmobile to be the best car of its class in the world. Evidence of an extraordinary sort supports this conviction.

The work it is doing the world over is nothing short of wonderful.

In Bombay, India, it has been given semi-official recognition.

Hupmobiles Kept; Other Cars Sold

No other car will be used there, hereafter, by the British government.

At the end of the campaign in German East Africa, the British government sold at auction all the surplus motor cars in its possession.

These cars had been used in its war operations.

The government ordered, however, that all its Hupmobiles should be retained in service; and has since ordered several hundred more Hupmobiles for military use.

Border Performance Called Remarkable

On our own border, reports of Hupmobile performance are so remarkable that, for military reasons, propriety forbids their publication.

In the mountains of Mexico, Hupmobiles owned by the rebel chieftain Villa have borne the brunt of his road operations.

His representatives have sought, and been refused, two hundred Hupmobiles to be used as the backbone of their army transport system.

War Work Shows Greater Value

These evidences of rugged fitness for war work are merely sidelights, which make the *greater* value of the Hupmobile stand out in bold relief.

That greater value is in the service of the home.

Not without reason has the Hupmobile been called the car of the American family.

It is the car of cars for the domestic circle seeking service free from excessive cost.

Re-Sale Value Very High

It is economical because of its simple four-cylinder construction, standardized by years of progression.

It is rugged; it is superlatively smooth; and it is astonishingly swift in pick-up.

It asks no odds on any point of performance, from any multi-cylinder car it may meet in competition. It has a very high re-sale value.

Safe, Sound, Sure Investment

From every angle, it is not only a most excellent and efficient motor car—but a safe, a sure, and a sound investment.

To repeat—now, more than ever, we believe the Hupmobile to be the best car of its class in the world.

Hupp Motor Car Corporation
Detroit, Michigan

Year-Ahead Beauty Features

Over and above its reputation for ruggedness, the new Hupmobile has won recognition as the year-ahead beauty-car. The following are typical of its 25 new style features:

Bright finish, long grain; French seam upholstery
Improved cushions and loop type back springs in seats
Leather-covered molding finish along edges of upholstery
Neverloak top, black outside, tan inside—waterproof
Teacase slip quarter curtains, integral with top
Front and rear edges of top finished with leather-covered molding

Hupmobile-Bishop door curtain carriers, folding with curtains—exclusive
Bright leather hand grip-pads on doors
Large deer pockets with special weighted flaps
Body a new color—Hupmobile blue
New variable dimming device, gradates brilliance of headlights
New soft operating clutch
Four Models—Two Chassis
Five-passenger Touring Car, Roadster,
Sedan—119-inch wheelbase;
seven-passenger Touring Car
—134-inch wheelbase



The New Hupmobile

When Writing to Advertisers, Please Mention Motor Age



This company's
distributors' proposition is attractive enough to interest the largest and most important distributors in the country. Demonstrated merchandising ability and solid financial backing are two requirements.

See announcement next week

For advance information wire or write MOTOR AGE, 95 West Fort St., Detroit, Michigan. Inquiries marked "Confidential" will be answered direct by MOTOR AGE and so treated.















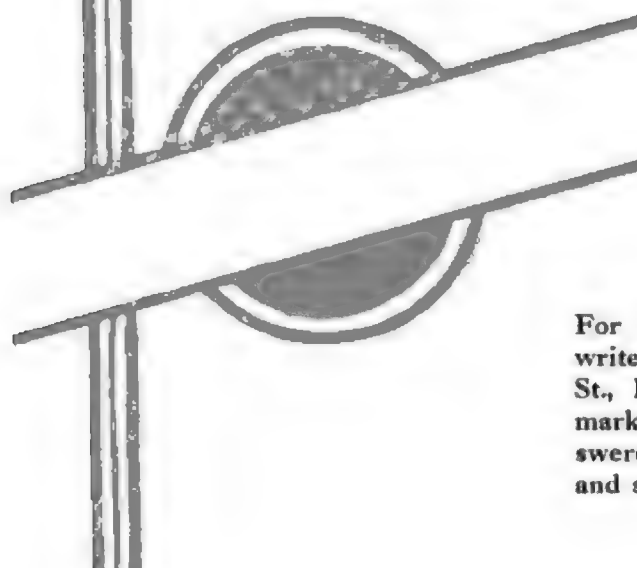




In the East—

the New England and North Atlantic States—there will be open for the first time to big distributors, several of the most fertile selling fields for these well-known cars and one-ton trucks. This territory will be allotted with discrimination and care. Applicants must qualify.

See announcement next week



For advance information wire or write MOTOR AGE, 95 West Fort St., Detroit, Michigan. Inquiries marked "Confidential" will be answered direct by MOTOR AGE and so treated.



National BRISCOE WEEK

July 7th to 14th (Inclusive)



BRISCOE \$725

THE CAR WITH THE
HALF-MILLION DOLLAR MOTOR

BRISCOE
MOTOR CORPORATION

DEALERS:

The Saturday Evening Post Announcement of Briscoe Week will be distributed in your territory July 5th.

This means a great opportunity to open the local exhibit Saturday, July 7th, and cash in on immediate sales. The new Briscoe, with its surprising features, will prove the greatest business magnet you've ever known.

You may still be able to conduct the exhibit if your territory has not already been closed.

WIRE now for complete plan.

NEXT week is Briscoe week in 1000 showrooms! The new Briscoe B4-24 models are, we believe, the best looking, the sweetest running automobiles in the field of light cars.

They are distinctive: meadow-green bodies, black fenders, filler aprons and cream colored wheels—the only light cars in which your pride is gratified by the distinctive looks of body and gear in different colors.

Ride behind the Half-Million Dollar Motor—inexhaustible power in this model! Building it entirely in our own factories makes possible the low price of \$725.

ANOTHER WAY

to know the Briscoe, read the complete story as told in the Half-Million Dollar Motor Book—write for it today.

Features

Half-Million Dollar Motor:
Bore 3.1 1/2 in., Stroke 5 1/2 in.
Detachable water cooled
engine per head. Valves com-
pletely enclosed.
Wheel Base—100 inches.
Rear Axle—Floating type.
Front Axle—1 beam sec-
tion shock fitted.
Lubrication—Oil pump,
sprinkler system.
Carburetor—Automatic.
Tires—20x3 1/2 in., non skid
on road.
Springs—Full elliptic front
and rear.

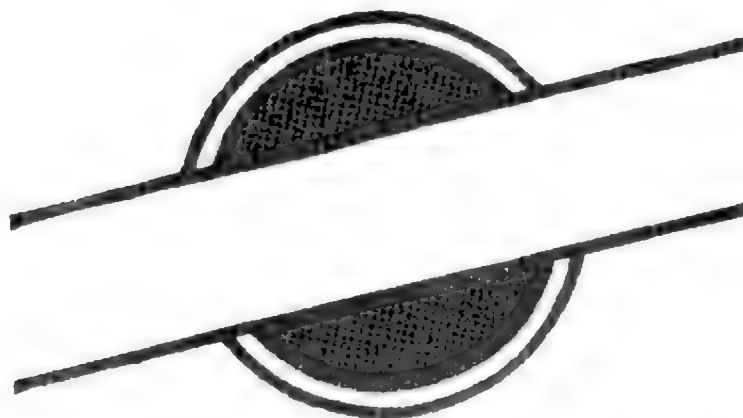
Tires subject to change
without notice.

BRISCOE MOTOR CORPORATION

Dept. 22.
JACKSON, MICH.

This manufacturer
has always recognized
the important status of
its dealers. Meeting the
dealers' increased cost of
doing business by increasing
its dealer discount, was no
more than appreciation of the
fact that dealer loyalty and
goodwill is a company asset.

See announcement next week



For advance information wire or
write MOTOR AGE, 95 West Fort
St., Detroit, Michigan. Inquiries
marked "Confidential" will be an-
swered direct by MOTOR AGE
and so treated.

SHOW YOUR COLORS



\$2⁰⁰
COMPLETE

NIGHT AND DAY

Flaglite is an illuminated flag for the automobile, not a novelty, but a flag spot-light, a roadside trouble lamp and an accessory with many other uses—plus an endless life.



As an inspection light

A silk flag, a brass parabola, silver-plated on brass inside and out, a bracket of cold rolled steel with baked hard rubber finish—a construction which cannot be improved upon.



BE FIRST TO SELL FLAGLITE

The Illuminated Flag Holder

Live dealers see the merit of *Flaglite* at once. The illustration on the opposite page shows better than any description. Here at last is a flag-holder in keeping with the feeling of patriotism that is leading every motorist to display the national colors on his car.

Beautifully Finished

Flaglight is no haphazard hook-on device that cheapens the feeling that prompts its use. It is a highly finished, rigid, unbreakable attachment that can be clamped to the radiator cap and wired in a few minutes. Once attached it will not wobble, slip or break, but remains firmly in place.

Flag Always Illuminated

Right under the flag standard, protected from dirt and rain by a *glass* cover, is a miniature headlight, pointed upward and built on the principle of the famous flood lamps used in illuminating flags on our public buildings. Other uses such as the illumination of the Moto-Meter or radiator emblem, or as a trouble lamp, are simply additional selling points for the wide-awake dealer's salesman.

Opportunity Is—NOW

Flaglite, packed carefully in a cardboard carton, sells for \$2, and our discount to dealers is liberal.

The demand for Flaglite is big now wherever it has been introduced—but it is going to be enormous. Write us at once, while we can take care of you. A wire will secure quicker action.

The Flaglite Company
Schofield Bldg.,
Cleveland, Ohio

Flaglite Sales Corporation
1790 Broadway
New York City

Send to nearest address

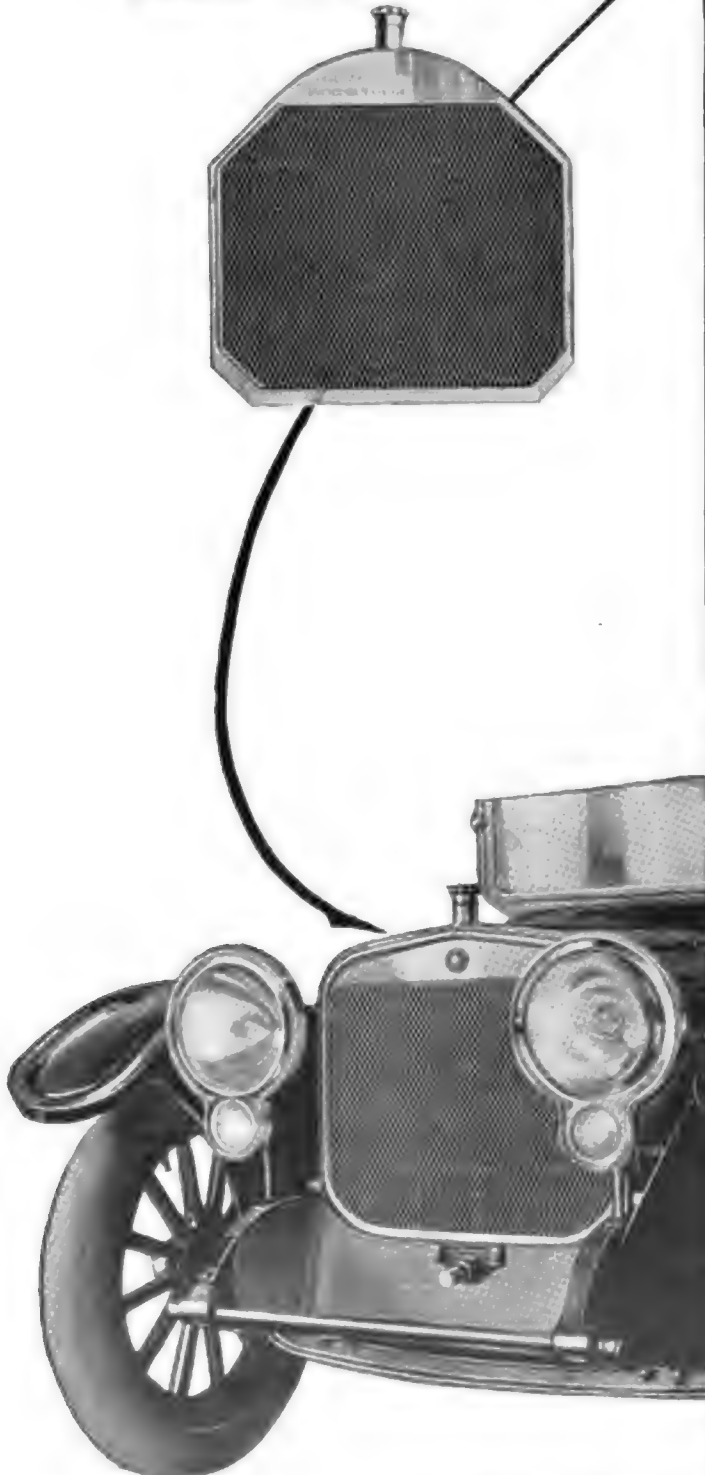
Flaglite Company
Schofield Bldg.,
Cleveland, Ohio
or 1790 Broadway, New York City

Please send me at once,
details of your big money-
making discounts for dealers on
Flaglite.

Name

Address

The Radiator identifies the car



DISTINGUISHING radiator individualizes the car on which it is placed. It endows that car with a personality that cannot be overlooked—enables the interested onlooker to instantly choose from all that pass—the car equipped with a Fedders Radiator.

The radiator is the face of the car. No other one feature adds more to the appearance or expresses more character. And while Fedders Radiators blend perfectly in the building of a car of utmost beauty of design, in still greater degree they contribute to the perfect operation of that car.



Through 13 years of radiator manufacture "Fedders" has stood for sterling worth. In the gruelling test of racing service they have won and hold unequalled honors.

Their continued use by the makers of the highest grade cars through a long term of years is proof positive of their inbuilt quality.

Fedders Radiators dominate the Motor Truck field. No greater endorsement could be attained than the fact that Fedders Radiators have for years met the exacting demands of commercial car service.

FEDDERS MFG. CO., Inc.
BUFFALO, N. Y.



Along the roads macadamized
The Motorist who is Brunner-wised—
Speeds smooth—with danger minimized
Because his tires are Brunner-ized—

The pleasures of motoring are enhanced and the dangers are minimized when tires are properly inflated—smooth rides with danger of blow-outs lessened are insured by Brunner Service—and that is why the Brunnerwise Motorist patronizes the garage displaying the Brunner Sign.



Ever since the garage business has been a business the Brunner Air Compressor has been consistently demonstrating its sterling worth to the garageman—in the garage. Year after year the demand for Brunner Air Compressor Equipment has been doubling over, simply because the Brunner Air Compressor has always stood up and given satisfactory service. The motorist who patronizes the garage displaying the Brunner Sign always finds an ample supply of clean, cool air at the proper pressure to inflate his tires correctly at his disposal.

The Brunner Sign Attracts the Trade of the Brunnerwise Motorist

Because he knows that the garage displaying the Brunner Sign is always prepared to render him prompt and efficient compressed air service—he knows that when he pulls up under the Brunner Sign he never has to drive away disappointed.



He realizes that clean, cool air, such as he always finds at his disposal under the Brunner Sign, will increase his tire mileage and will reduce the dangers of motoring to a minimum. That is why the trade of the Brunnerwise Motorist follows the Brunner Sign.

The Safe Way Is the Brunner Way

The Brunner Air Compressor has always proven true to the Jobber who sells it—the Garageman who buys it—and the motorist who uses it—are you Brunnerwise?

The Garageman who buys Brunner Equipment is never disappointed for the reason that it has never been necessary to resort to misleading advertising claims in order to bolster up the sale of Brunner Equipment and the garageman purchasing Brunner Equipment always receives just what he expects and "a little bit more."



INVESTIGATE THE **BRUNNER** AIR COMPRESSOR

Be honest with yourself and investigate the garage air compressor question thoroughly before deciding on your new equipment. The Brunner will stand investigation and the more thorough the investigation the more certain will be your decision in favor of Brunner Service, because it not only insures compressed air efficiency of the very highest order, but it also insures that very desirable and liberal patronage of the Brunnerwise Motorist, which follows the Brunner Sign.

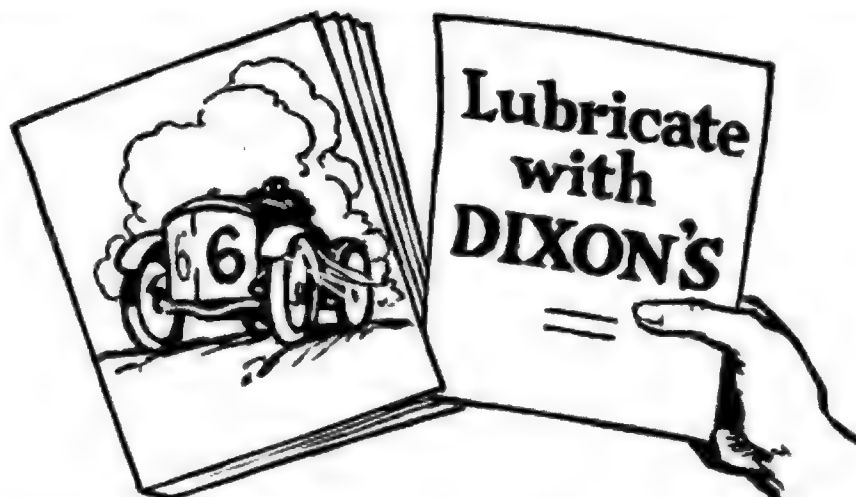
We will be glad to send you the name of the Brunner Jobber who covers your town, also our catalogue and Garageman's Handbook on Compressed Air—a book which every garageman should read carefully. They are all free for the asking.

BRUNNER MANUFACTURING COMPANY

Main Office and Plant:
UTICA,
N. Y.

Cincinnati Branch:
CINCINNATI,
OHIO





Take a Leaf From the Racers' Book

Once more a Dixon-lubricated car has demonstrated Dixon dependability. Earl Cooper, winner of the 250-mile Chicago Speedway Derby, says, "*Dixon's Graphite Automobile Lubricants are about as necessary to a racing car as gasoline.*"

DIXON'S GRAPHITE Automobile LUBRICANTS

have won the following "firsts" this year:

Driver	Car	Track	Date
Billy Taylor	Newman Special	Uniontown, Pa.	May 10
Louis Chevrolet	Frontenac	Cincinnati	May 30
J. P. Fetterman	Peerless	Uniontown, Pa.	May 30
Dave Koetzla		Detroit (dirt track)	May 30
Earl Cooper	Stutz	Chicago	June 16

Not only have Dixon's been used in the winning cars, but nearly every contesting car was kept Friction-free by Dixon's. Practically every racing driver of note uses Dixon's regularly. The drivers demand the very best for their cars and they are in a position to get it. The superior lubrication is the reason for their choice of Dixon's and the repeated Dixon victories are proof of that superiority. Here's something for the everyday driver of pleasure or commercial cars to remember: Dixon's prevent that metal-to-metal contact which makes Friction, and Friction spells ruin to your car. Get rid of Friction by lubricating with Dixon's.

Write Department 82 for the Dixon Lubricating Chart.

JOSEPH DIXON CRUCIBLE COMPANY

JERSEY CITY, N. J.

Established 1827





What's Under the Hood?

How do you judge a car? By its appearance—its clever advertising, fine body lines, upholstery and appointments—or by its specifications and what it will do? What's under the hood? That is a question of the utmost importance to every prospective car owner. An automobile is only as good as its weakest unit. One faulty part destroys the efficiency of the entire car.

GLIDE "LIGHT SIX" \$1295

The reputation of the Glide Six was established by performance—not promises. It has given steady, satisfactory service on all kinds of roads and under all sorts of conditions. The Glide is not merely a show car for city boulevards but has the strength, power and endurance necessary to climb steep hills and negotiate rough country roads. The Glide is handsome in design with graceful yacht-line body, luxurious upholstery and refined appointments that give pride of ownership and automobile comfort.

Write Now

For Complete Specifications and Agency Proposition

A comparison of the Glide specifications with those of any other "Six" will prove beyond a doubt that the Glide is the best "Six" at the lowest price for which a car with Standard Specifications and as complete equipment can possibly be produced.

SOME GOOD TERRITORY FOR THE GLIDE "SIX"
STILL OPEN. WRITE FOR DEALERS' PROPOSITION,
COMPLETE SPECIFICATIONS AND LITERATURE.

THE BARTHOLOMEW COMPANY, 300 Glide St., Peoria, Illinois

HESS-BRIGHT

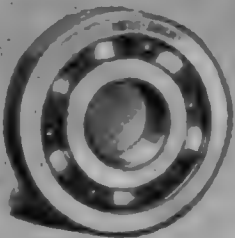
SEND FOR
THIS NEW
LITERATURE

HESS-BRIGHT
BALL BEARINGS

HOW TO APPLY THEM

The Application of
Ball Bearings to
the Airplane

THE CARE OF
BALL BEARINGS



HESS-BRIGHT
MONARCH BALL BEARING

HESS-BRIGHT MANUFACTURING CO.
PHILADELPHIA, PA.

THE HESS-BRIGHT MANUFACTURING COMPANY
PHILADELPHIA, PA.
MANUFACTURERS OF THE "BETTER BEARINGS"

THE HESS-BRIGHT MANUFACTURING CO.
PHILADELPHIA, PA.

THE HESS-BRIGHT MFG. CO.
FRONT ST. AND ERIE AVE.
PHILADELPHIA, PA.

Rust Proofing *the* Motor Car Industry



DARKER
PROCESS



RECEIVING



SAND BLASTING



PICKLING

PARKER PROCESS has proved its worth

The results which have been secured by over one hundred and fifty motor car and motor car accessory manufacturers justify this more general solicitation for recognition of the PARKER PROCESS by the motor car industry.

Without exception, where the question of the prevention of corrosion is the desired end, those manufacturers who have tried the Process have renewed their contracts, not only for the parts on which the treatment was tested but in many cases for various other parts which need this protection.

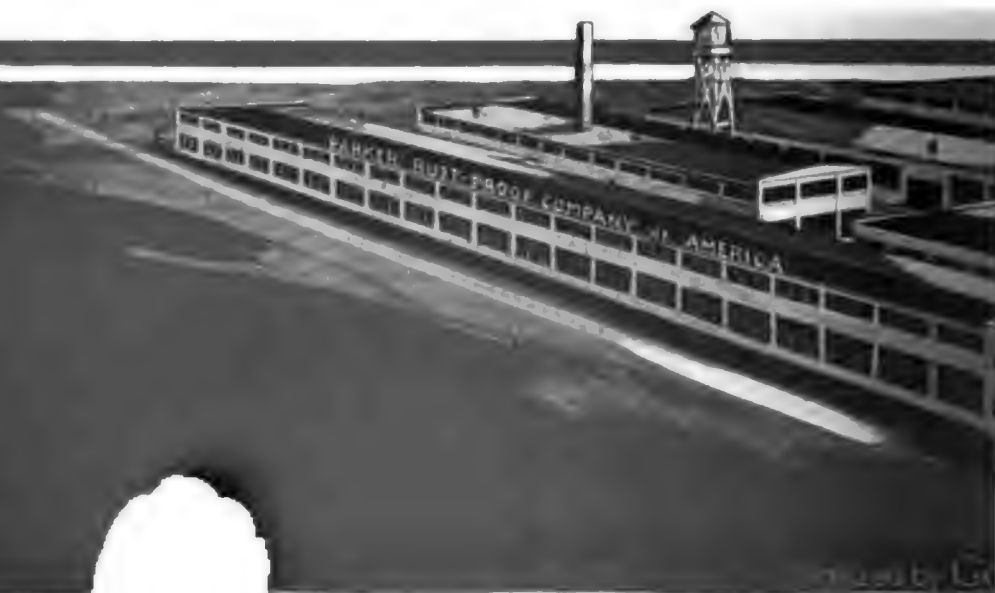
The PARKER PROCESS has enabled manufacturers in many instances to substitute steel and iron for more expensive non-corrosive metals. The saving afforded in this way can hardly be estimated.

One of the highest quality cars produced in America now has 283 parts treated with the PARKER PROCESS.

The most prominent engineers in the industry have studied the PARKER PROCESS carefully, subjected it to the most rigid tests, and it has yet to be found unsatisfactory for the parts for which our chemists recommend it.

We ourselves can hardly realize the tremendous importance of these statements we are making here. It is hard to believe that such a process has proved its worth in this way, but we are stating simple facts which we know will be to your great advantage to investigate.

Use of the Parker Process is being placed as quickly as possible at the disposal of every manufacturer in the country. The twenty-four branch plants will be in operation very quickly in the industrial centers. The production plans of many factories do not allow finished products to be shipped to Detroit for treatment, and without our branches it would be necessary for the process to be installed in their own plants which is not always possible.





PROCESSING



OILING



SHIPPING

What the PARKER PROCESS is—

Any form of iron or steel construction may be treated.

The parts are cleansed either by sand blast, soda wash or other simple means, then placed in a vat containing the PARKER PROCESS solution. This is maintained at a temperature of 212° —they are left in this solution until the chemical reaction ceases, the time varying from one to three hours.

This treatment is not what would be considered a coating process, but becomes more nearly an actual part of the metal.

After the metal is taken from the solution it is then immersed in an oil bath, which is a special formula for this purpose. This oil bath is intended to neutralize the chemical action and make it permanent. The finish left is a deep, flat black, which will take enameling, varnishing or painting advantageously if such other final finish is desired.

This process does not change the dimensions of the most delicate models. It has no effect whatever on sharp edges or screw threads, and the temper and resiliency remain unchanged.

Articles may be successfully treated either before or after assembling.

The PARKER PROCESS, although the only really effective method of preventing corrosive action, is also less expensive than any other treatment.

The remarkable efficiency of the PARKER PROCESS makes it possible to substitute iron and steel for brass, copper, bronze and aluminum.

It is an interesting fact that the Parker Rust-Proof Company of America not only own all fundamental patents on rust-proofing as distinguished from metal plating, but all basic patents on the vats and other apparatus used.



In order to make our distribution absolutely complete, we are now considering applications for licenses from concerns desiring to build and operate rust-proofing plants in the cities where we will not operate plants of our own. The number of requests received for such licenses justifies us in believing that every city of any importance will have a Parker Process plant in operation within the next twelve months.



CLARK W. PARKER, President



WYMAN C. PARKER, Sec'y-Treas.



About the Parker Organization—

The plant at Detroit is now capable of handling two hundred tons of metal per day.

Twenty-four other plants are at present being planned: One at Cleveland is already in operation.

Manufacturers may send their metals either raw or finished and assembled to one of our plants, or secure a license to operate the process in their own plants.

We ask an opportunity to demonstrate to you on your product just what the PARKER PROCESS will mean to your output. You are invited to test it in any way you wish, to make it prove its worth to your entire satisfaction.

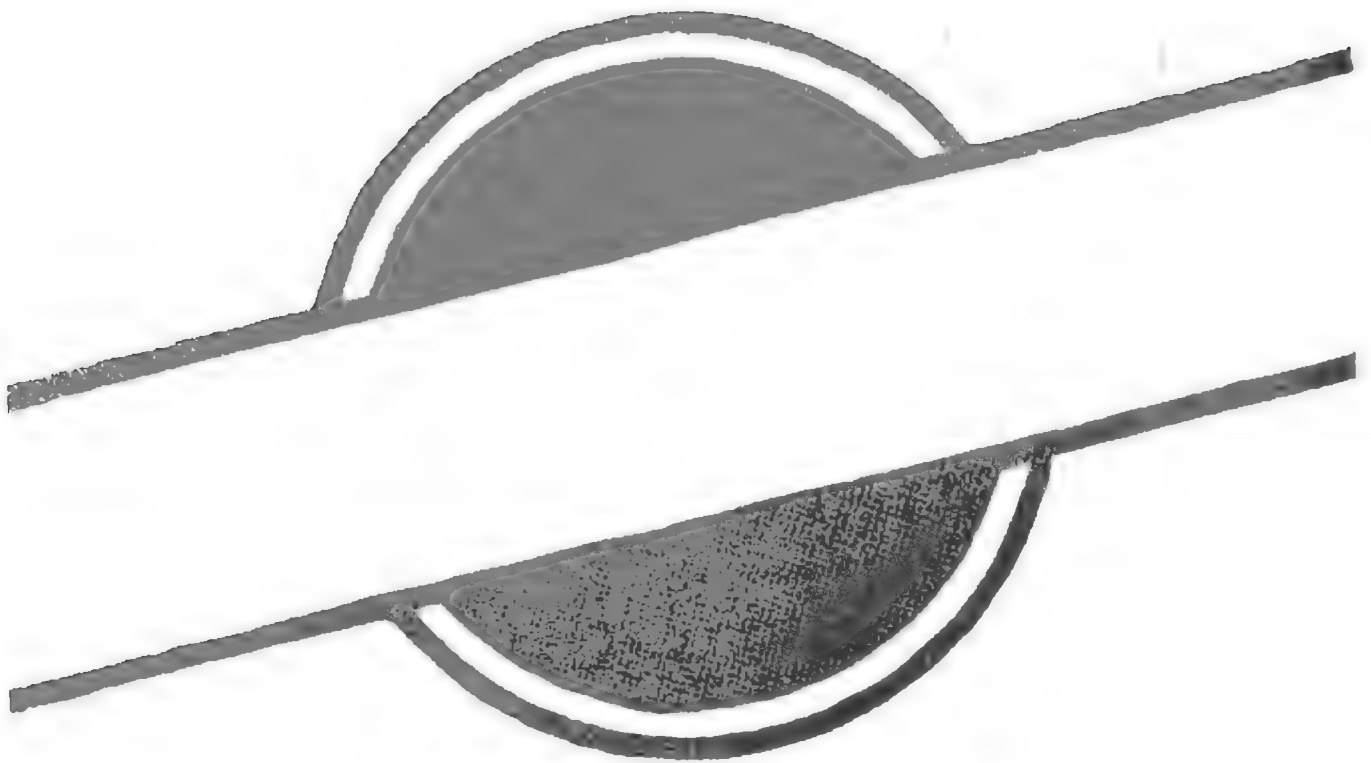
A visit to our plant and a consultation with our engineers may bring out a definite way in which the PARKER PROCESS will prove profitable for you.

PARKER
RUST-PROOF COMPANY OF AMERICA
DETROIT



Six Trucks Required for Detroit Deliveries.

Designed by G. H. ...



A one-ton truck
to supplement its
passenger car—both
selling below \$800
—is a feature which makes this
company's dealerships and
distributorships unusually
attractive.

See announcement next week

For advance information wire or write MOTOR AGE,
95 West Fort St., Detroit, Michigan. Inquiries marked
"Confidential" will be answered direct by MOTOR AGE
and so treated.



The Consolidation of Permalite and W. L. Battery Company

Is the result of the enormous increase of the
National Storage Battery Exchange Service

We have been proving constantly that Permalite is the greatest advance in years in convenience to the motorist. It has been necessary to add to our equipment to meet the growing demand for Permalite, with the result that we have secured, for life, the services of Mr. Frederick Wright, a genius who has been responsible for the success of more than one storage battery, and the factory of the W. L. Battery Company, at Poughkeepsie, N. Y. This large, modern plant, and, back of the plant, Mr. Wright, will enable us to supply our customers more promptly. The quality that has been built into two distinct batteries will now be built into

Permalite

"LASTS FOREVER"

THE NEW NAME OF THE ONLY NATIONAL STORAGE BATTERY EXCHANGE SYSTEM will more accurately express the spirit of our service—that from the standpoint of the motorist, Permalite lasts forever—and will avoid confusion with automobile accessories with similar names.

DEALERS, ATTENTION:

**Permalite merchandising plan is
the most astounding Battery prop-
osition ever offered the motorist**

Do you remember what it meant to have the first guaranteed tire? Here is another sensation in the automobile field that is sweeping the country. Permalite is the first real guaranteed storage battery—the battery that never wears out, from the standpoint of its service to the user. It put money in his pocket as well as yours. You can control the battery business in your territory with Permalite. If there is no Permalite dealer in your town, wire Dept. M A-7 at once for our unusually attractive proposition.

Permalite Storage Battery Company, Inc.

Factory and General Office: Poughkeepsie, New York
General Western Office: Indianapolis, Indiana
Service Stations and Exchange Depots Everywhere

When Writing to Advertisers, Please Mention Motor Age



The New Stewart V-RAY SEARCHLIGHT

AT last! Here is a real searchlight. Brand new in design, in construction, in finish and efficiency. In the usual progressive Stewart way the Stewart V-Ray Searchlight represents a decided departure from the ordinary "bullet" design of "spotlight". This is in every sense of the word a *Searchlight*. It is designed with scientific accuracy for but one purpose—to produce an intense concentrated "Searchlight" beam.

Note how clean-cut and compact it is. Light in weight, well proportioned, it is the embodiment of convenience.

Symmetrical in design—it looks like a part of the car and not an after-thought addition.

The V-Ray Searchlight is correctly balanced below the bracket. Has rigid support and perfect balance. It cannot vibrate and jar out of position, making it possible to turn the Searchlight in the desired position so that it "stays set."

This bracket mounting is worked out on a principle of three-point suspension, which makes it positively universal. Without tugging or pulling, but with ease, you can throw the penetrating V-Ray Searchlight in any direction—front, down, back or to either side.

It has a full 6" curved lens—not plain window glass. A 3½" reducing mirror is located in the center of the back. It is not necessary to twist the light out of position in order to use the mirror.

The switch is so located that your hand finds it instantly in the dark. The back is formed with a recess so that the hand can grasp the light quickly, and with ease turn it in any direction. The Searchlight is so designed that the bulb can be removed and replaced in a few seconds. The reflector is silver-plated—not merely polished tin. The Stewart V-Ray Searchlight is moisture and dust-proof. It comes complete with mirror, electric cord and bracket, which fits every car—and the price is only \$5.00. West of Rocky Mountains \$5.50.



\$5 COMPLETE

\$9 COMPLETE
Special Model for Fords
\$7.50



The New
Stewart
AUTOGUARD

DEALERS

Get busy quick. This is your chance for added profits. There will be BIG Stewart Successes.

New Stewart Autoguard

This new Stewart Autoguard is all that its name implies—a real Guard for your car.

For safety's sake you should have a Stewart Autoguard, both on the front and rear of your car. It will pay for itself the first time someone backs into you. Saves your fenders, headlights, springs and tires. Because it guards your car against damage it keeps your car in service—keeps it out of the repair shop. The Stewart Autoguard has many exclusive features. It has a rigidity combined with springiness not found in common "bumpers." The cross member or channel bar is made of high carbon steel. The spring members are made of high carbon spring steel. Light in weight—few parts. It has universal adjustable brackets which fit any make of car.

The Stewart Autoguard complete with brackets for mounting costs only \$9.00. West of Rocky Mountains \$9.75. Special model for Fords \$7.50. West of Rocky Mountains \$8.25.

Stewart-Warner Speedometer Corporation
Chicago, U. S. A.



That Summer Home -

YOUR summer home, lighted and supplied with electric current by means of a Genco-Light Light and Power Plant, will yield you more than double the pleasure you got out of it last year.

It doesn't matter where your summer home is, in the country, mountains or seashore, the Genco-Light Light and Power Plant is what it needs to complete your vacation comfort.

The Genco-Light Plant will light it effectively and cheaply, and at the same time help in a multitude of other ways such as recharging the storage batteries of your car or motor boat; furnishing power for a vacuum cleaner; operating a washing machine; churn or farm machinery; or running a lathe or other tools in your shop or garage.

The Genco-Light Light and Power Plant consists of a specially designed self-starting, gasoline-kerosene engine practically noiseless and vibrationless, coupled directly to a generator which feeds a 16 cell storage battery.

This splendid piece of machinery is so simple that a woman can operate it. It has been made so safe that a child cannot hurt himself with it.

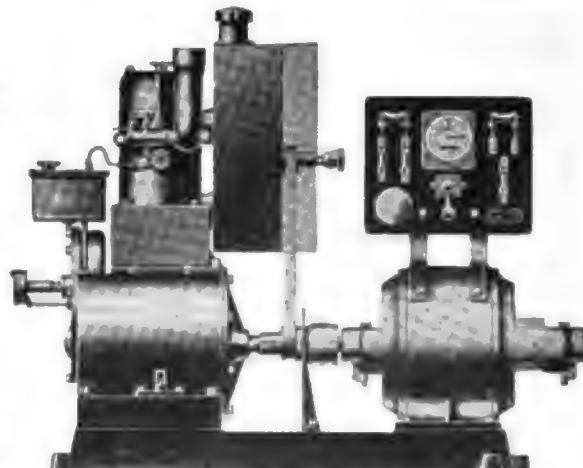
WE WANT DISTRIBUTORS

Our selling and distributing plan offers you an unusual opportunity to make big money. Write for it today. Your territory may still be open.

General Gas Electric Co.

Hanover, Pa.

U. S. A.



GENCO-LIGHT

Light & Power Plant

for FARM & HOME



Speed Bodies



For Fords

Also for Maxwells, Overlands,
and Saxons

Write for Special Prices

Now Down to \$65

Right along, until now, LAMCO Speed Bodies for Fords have cost \$130, from your dealer. Now they are way down to \$65, *direct from us*. All the salesmen's salaries, distributors' commissions, dealers' profits are knocked off, *for you*. LAMCO Speed Bodies for Fords have come —

**Right Down to the Price YOU Can Afford
Because of the Tremendous Demand**

The big new addition to the LAMCO Factory is now going full tilt. It is turning out LAMCO Speed Bodies so fast, and in such quantities that production cost is lower than ever before.

That is why we are going to sell to you *direct by mail*. Three-fourths of the LAMCO business has always been by mail, with all the middlemen getting their commissions just the same.

Now they're out of it. When you order a LAMCO Speed Body you pay for what you buy, and you get *rock bottom price—\$65—the lowest price in the world for LAMCO* quality, with finely upholstered bucket seats, linoleum covered floor boards, large gas tank, and spare tire carriers, finished in any color without extra cost to you.

\$25 is all you send now—check, money order or draft—and \$40 when your LAMCO Body comes to your door. USE THE COUPON NOW for speedy delivery of the kind of body that rides in the front row when the pace is fastest. Just \$65. Only \$25 down.

IMMEDIATE DELIVERIES

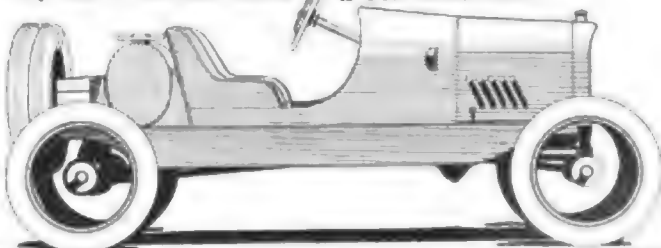
LEHMAN MANUFACTURING CO., Cannelton, Indiana

\$65

Direct to
You

Order
With the
Coupon
NOW

Top and Windshield Extra If You Want Them



LAMCO SPEED COUPON

Lehman Manufacturing Co.
Cannelton Indiana

Enclosed find \$25 for LAMCO Speed Body for my Ford chassis, remaining \$40 to be paid on receipt of body.

Name _____

Address _____

If for any reason the LAMCO Body you send me is unsatisfactory, I will return it at once and receive back my money. (Money returning obligation void where prohibited.)

When Writing to Advertisers, Please Mention Motor Age

The Endorsement of Quality



IN THE LEADING MAKES OF CARS

BOUND BROOK

TRADE MARK REGISTERED UNITED STATES PATENT OFFICE

OIL-LESS BUSHINGS

Bound Brook Graphite & Bronze Oil-less Bushings are used in the leading makes of cars in just the places that are difficult or impossible to keep properly lubricated.

Bushings that are continuously located are automatically lubricated, and lack of proper lubrication means quicker wear and shorter life for the operating parts of the car.

The following are the cars in which Bound Brook Oil-less Bushings are used:

with Bound Brook Oil-less Bushings:

Bound Brook Oil-less Bushings are not generally known. These "oil-less" bushings are made of a special material that gives them smoothness, failure to oil them may not cause them to wear. These bushings reduce noise and prevent strain on the car.

They represent a form of over-lubrication, and are not to be confused with the ordinary oil-lubricated bushings.

Using Bound Brook Oil-less Bushings remain efficient even if neglected.

We have specialized in the production of Oil-less Bushings for more than a third of a century.

We will be glad to cooperate with any manufacturer in helping him meet his bearing lubrication requirements.

Also manufacturers of Nigum (Impregnated Wood) OIL-LESS Bushings.

BOUND BROOK OIL-LESS BEARING COMPANY, Bound Brook, New Jersey

All patents registered in U.S. Patents & Office of Trade Marks, Bound Brook, N. J.

When Writing to Advertisers, Please Mention Motor Age



HAYES

WIRE WHEELS

Can be changed in eleven seconds without soiling your clothing. Hub caps are furnished with automatic locks—wheel *cannot* back off—action of wheel forward serves to tighten cap. Write

CASTLE & KYTE

EXCLUSIVE SELLING AGENTS
872 Woodward Ave., Detroit, Mich.

When Writing to Advertisers, Please Mention Motor Age

Where Perlman



BIRD'S EYE VIEW
of the
PERLMAN RIM CORPORATION
JACKSON, MICHIGAN, PLANT

Demountable Rims *are made*



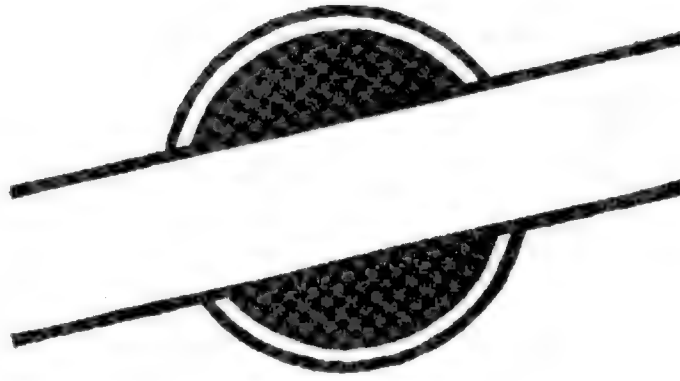
The largest and only exclusive demountable rim plant in the world, covering five acres.
The mechanical equipment is new and up to date, ensuring volume and quality production.
Producing five thousand sets of demountable rims every working day.
Enough to equip over one million, five hundred thousand (1,500,000) motor cars annually.
Prompt shipments of demountable rims in any desired size and quantity.

Perlman S. A. E. Rims and S. A. E. Steel Rims — Are U. S. Army 1 1/2 and 3 Ton Military Truck Standard — For S. A. E. Demountable Solid Tires — Single and Double.

We select your demountable rim business, trusting correspondents.

PERLMAN RIM CORPORATION

When Writing to Advertisers, Please Mention Motor Age



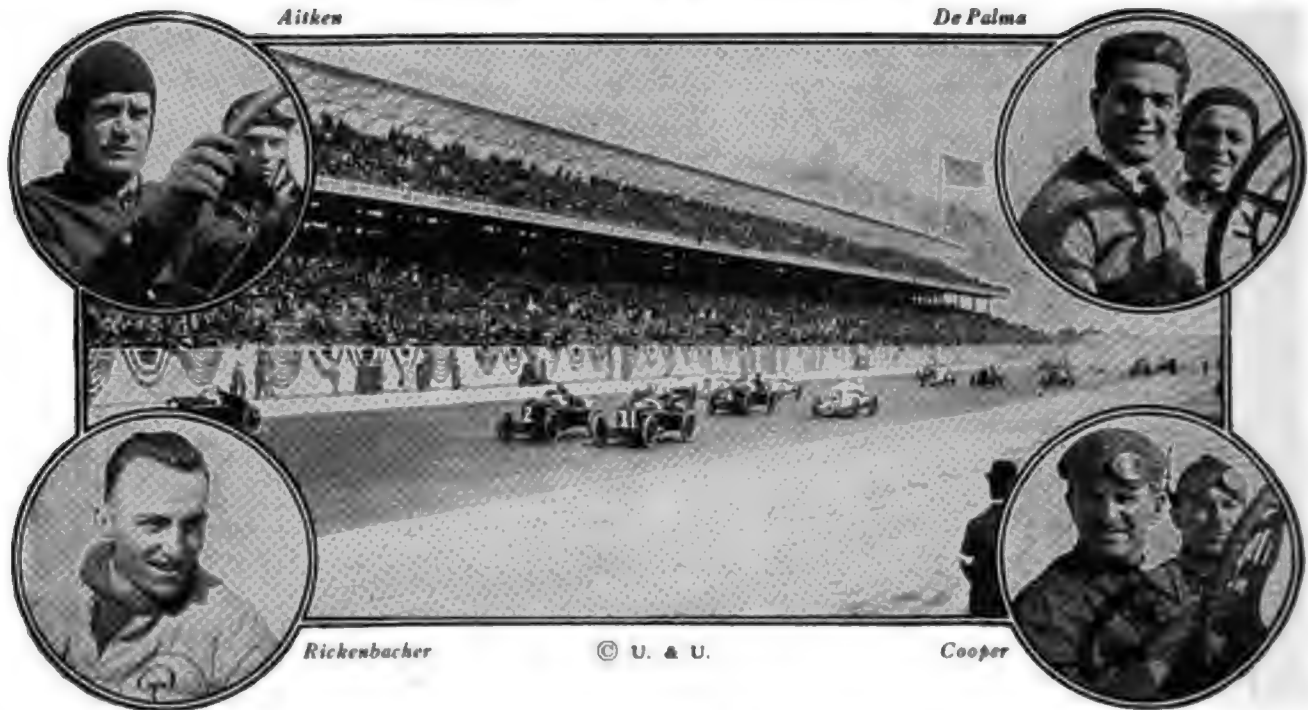
Big dealers.

and distributors—
small dealers and
distributors—share
alike in the in-
terest, cooperation, the sell-
ing support of the parent
company.

This company is now
spending hundreds of
thousands of dollars to help
its dealers and distributors
make *more sales* and
greater profits.

See announcement next week

For advance information wire or write MOTOR AGE, 95 West Fort St., Detroit, Michigan. Inquiries marked "Confidential" will be answered direct by MOTOR AGE and so treated.



Why racing drivers use Thermoid Brake Lining

Racing drivers must be absolutely sure of their brake lining. Their lives depend on it.

That is why leading drivers—De Palma, Cooper, Aitken, and Rickenbacher—endorse Thermoid Brake lining.

They know it won't grab or slip.

These cars use Thermoid Brake Lining—

<i>Pierce-Arrow</i>	<i>Metz</i>	<i>Sun</i>	<i>Superior Truck</i>
<i>Studebaker</i>	<i>Cole</i>	<i>Ames</i>	<i>Bessemer Truck</i>
<i>Chalmers</i>	<i>King</i>	<i>Moon</i>	<i>Sayers & Scoville</i>
<i>Peerless</i>	<i>Briscoe</i>	<i>Pilot</i>	<i>Gersix Truck</i>
<i>Marmon</i>	<i>Autocar</i>	<i>Empire</i>	<i>Republic Truck</i>
<i>Apperson</i>	<i>Hudson</i>	<i>David</i>	<i>Fulton Truck</i>
<i>Premier</i>	<i>Cadillac</i>	<i>National</i>	<i>Columbia Truck</i>
<i>Auburn</i>	<i>Atlas Truck</i>	<i>Kline Kar</i>	<i>Denby Truck</i>
<i>Haynes</i>	<i>Pathfinder</i>	<i>Stevens</i>	<i>Bethlehem Truck</i>
<i>Kissel</i>	<i>Rauch & Lang</i>	<i>Patterson</i>	<i>Union Truck</i>
<i>White</i>	<i>Denmo Truck</i>	<i>Lippard</i>	<i>Hudford Unit</i>
<i>Service Truck</i>	<i>Moreland Truck</i>	<i>Stewart Truck</i>	
<i>Lexington-Howard</i>			

These axles use Thermoid Brake Lining—

<i>Timken-Detroit</i>	<i>Peru</i>	<i>Russel</i>	<i>Celfor</i>
<i>Columbia</i>	<i>Sheldon</i>	<i>Empire</i>	<i>American</i>
	<i>Torbensen</i>	<i>Hess</i>	

Why don't you specify the brake lining these experts specify — Thermoid?

Thermoid Rubber Company TRENTON, N. J.



Makers of "Thermoid Tires" and "Thermoid Garden Hose"

**Hook Up with the
SAFETY Vulcanizer**

**Awarded Priority
of Invention
in the
United States
Patent Office**

**Price
\$1.50**

**More
Than
400,000
Now
in
Use**



VICTORY

**Is Won by
Safety 5-Minute Vulcanizer
in the United States Patent Office**

DEALERS

**Write for a Copy
of the Patent Office
Decision of May 12**

Explains in detail why the United States Patent Office awarded SAFETY Vulcanizer Priority of Invention. IT IS FREE TO DEALERS AND JOBBERS for the asking.

Write for your copy today.

If there was ever any doubt in the mind of anyone, as to the *original 5-Minute Vulcanizer*, that doubt is now abolished by the award of Priority of Invention allowed SAFETY 5-Minute Vulcanizer, by the U. S. Patent office, May 12, 1917.

SAFETY was *first in patents* as it has always been first in everything it has ever attempted. There are more than 400,000 SAFETY 5-Minute Vulcanizers in actual use today. The service they give is superior to that of any imitator. And the Patent Office has decreed that it is legally safe to sell and use them.

Every car on the road needs a SAFETY Vulcanizer. It is always ready for immediate use in emergency. Its presence in any tool box may prevent the ruin of an expensive casing, a rim or an inner tube. Just one such experience makes the SAFETY 5-Minute Vulcanizer pay for itself—and then some.

Big Safety sales are waiting for dealers. The demand is universal. The time is seasonable. Write for complete details of the new sales boost—and get in on the profits.

SAFETY VULCANIZER MFG. CO.
213-215 Federal Avenue, S. MASON CITY, IOWA

One United Tractor Gives You the Service of A Fleet of Trucks

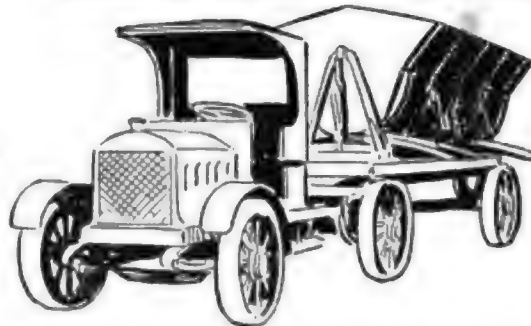
HERE is the way America's leading firms, from those who use big fleets to those who need only one truck, are solving their hauling problems—most efficiently—with the lowest expense.

UNITED
Trailer Tractor

and

Several Trailers
Pulled Like This

Six-Ton Capacity
\$2490



The United does everything a truck can do and many things a truck cannot do. It means **one** power plant—one upkeep—one motor to supply with gas and oil—one driver's expense for the service of a fleet. It is a powerful Internal Gear-drive Tractor, not merely a short wheelbase truck.

With the United you can haul a 3-ton load more economically than on a truck of 3-ton rating. You can operate a number of trailers of any body type. You can use your old wagon equipment or trailers with stake bodies, or gravity dump, or steel dump with hydraulic hoist.

We Can Supply You With Every Type of Trailer Body Equipment

The United is hauling one load while another trailer is being loaded or unloaded. No idle trucks. No idle men. Patented spring suspension at rear relieves tractor chassis of all load weight and gives utmost flexibility. Universal action of rocking trailer platform gives free movement

in all directions. Weight distributed on three axles. 60 per cent of load on rear axle of trailer. Has shortest turning radius. Get all the facts about its **many** exclusive advantages. Write at once for our liberal proposition and full descriptive literature. Or come to the factory.

Address: 673 North St.

UNITED MOTORS COMPANY, GRAND RAPIDS, MICHIGAN

Manufacturers of United Motor Tractors and Trucks

A United tractor hauls many times the load it could carry on the principle of the United Tractor



Getting "Satisfaction"

YOU have a right to demand for your money a car that really satisfies. In buying a Dorris you readily recognize what getting "satisfaction" means. Because there's supreme quality in every inch and every ounce of the luxurious Dorris pleasure car.

Designed and perfected by a master engineer, it ranks foremost among the few really high-grade cars in America. Noteworthy a dozen years for unchanged fundamental features accepted as absolutely correct in modern motor practice.



"Built up to a Standard, Not down to a Price."

Seven-Passenger Touring Car.....\$3075
 Four-Passenger Four-Door Tourist..... 2475
 Four-Passenger Coupe 3250
 Five-Passenger Sedan 3350
All the above on the famous Dorris 6 cyl. Chassis
 Two-Ton Worm Drive Truck Chassis.... 2285
Prices f. o. b. St. Louis

The conspicuous feature of the Dorris is the Original Dorris Perfected Valve-in-Head Motor—a wonder of a willing engine, flexible, sweet-running, economical in its call for fuel and oil. Long, easy-riding platform spring insures extreme comfort.

NOTE TO DEALERS

We have a remarkable proposition to make to live dealers. We back our dealers to the limit with the service of a live, new organization working with an increased capital of \$1,000,000.00. We want you in our camp. Write us today.

DORRIS MOTOR CAR CO.

Laclede and Sarah :: St. Louis
 Manufacturers



When Writing to Advertisers, Please Mention Motor Age



PETROGRAD, RUSSIA

SAN FRANCISCO, U.S.A.

S K F

THE World-wide popularity of S K F Ball Bearings is an indication of their quality. Surely ball bearings that are known and used universally must have merit very much above the average. Look for the mark S K F—it is the visible symbol of a service.

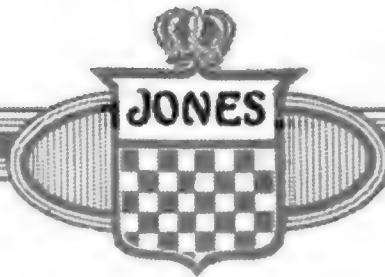
SKF BALL BEARING CO.

HARTFORD

CONNECTICUT



When Writing to Advertisers, Please Mention Motor Age



"A Car as Sound as a Liberty Bond"

Special Distributing Propositions

THERE ARE SOME remarkably attractive and liberal distributing propositions open in Iowa, Nebraska, Missouri and Texas for the Jones Six-Sixty line of motor cars.

IF YOU ARE NOT familiar with Jones "pleasing appearance and mechanical efficiency" it will be well worth your while to write Department MA for detailed information concerning the most remarkable buy of the 1917 automobile production.

Jones motor cars are designed and built to harmonize with the conviction that there is an ever-growing demand for a moderate priced automobile in which pleasing appearance is combined with great mechanical efficiency.

Jones designers began upon a foundation of sound and approved engineering, and from

that base they worked outward to those attributes which have an appeal to the eye.

As a result, Jones motor cars are good to look upon and what is of far greater importance they possess the inner worth which can be had only with these engineering principles in accordance with which they were built.

The Jones Six is a medium-priced car with less than medium weight—has all the appearance, power, capacity and ability of the high-priced cars—there is not a line of its beautiful design similar to that selling at a lower figure—in short—it is a car with a \$3,000 appearance and performance selling now at less than half that price.

\$1475



The Jones Motor Car Company

MANUFACTURERS
WICHITA

When Writing to Advertisers, Please Mention Motor Age

As you glide into the glare

of entrance lights, in line with the elite of motordom, does your car suffer in comparison with others?

The best way to keep your car looking clean and fresh is to see that the top—the all-important top—is covered with

Genuine *Pantasote*

the most expensive, the most durable and the most admired of all top materials.

The small extra cost of *Pantasote* leaves no excuse for substituting a cheaper material, even on moderate priced cars.

The salesmen of such cars, which use *Pantasote*, have real talking points on top material.

Tops with *Pantasote* label are an asset to both dealers and dealers' salesmen.



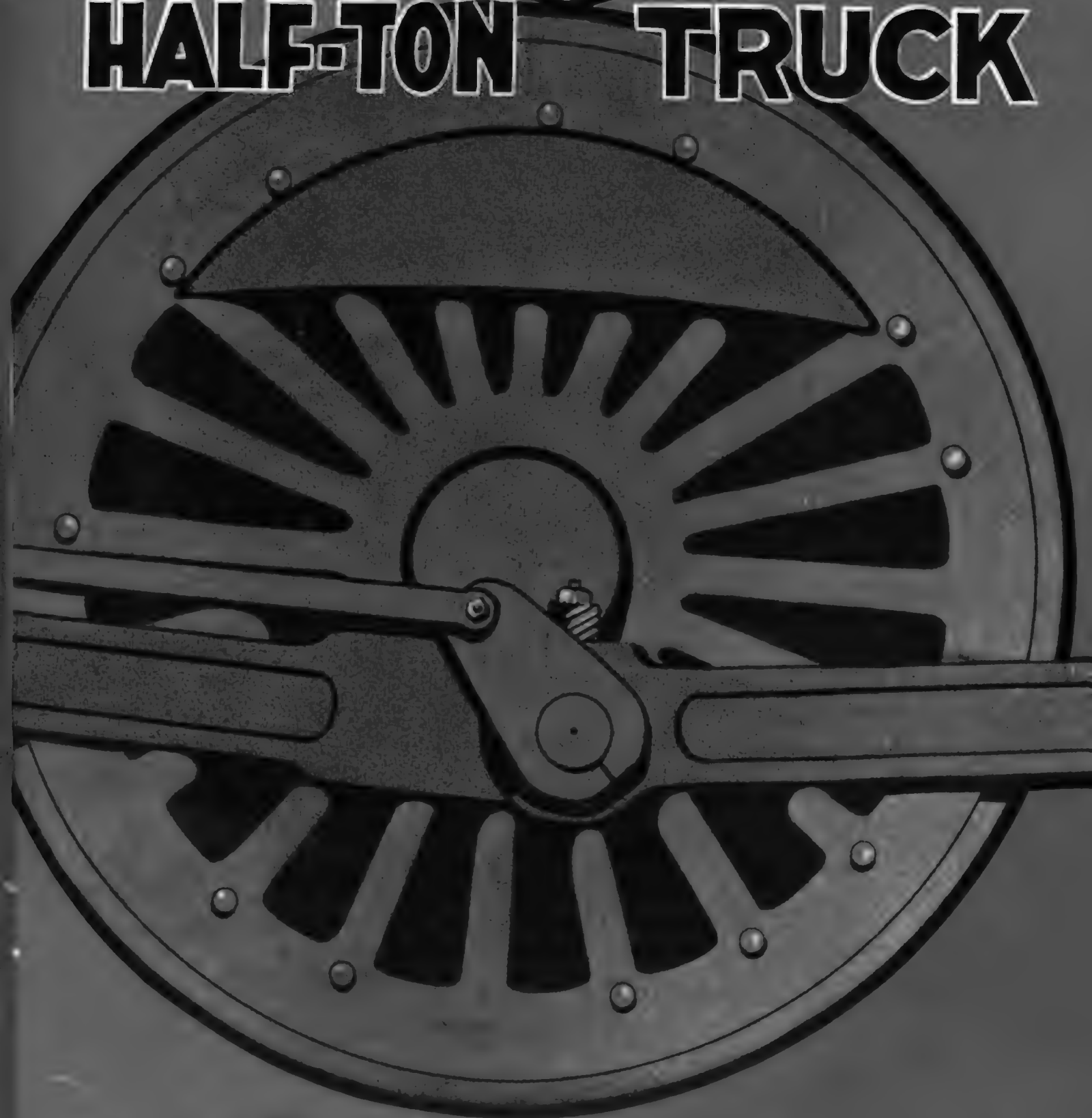
PIERCE-ARROW	PAIGE STRATFORD
LOCOMOBILE	REO 1917 SIX
CHALMERS	WESTCOTT
CHANDLER	COLUMBIA
MAYBORN	PREMIER
HUBBARD	MERCER
WHITE	

The Pantasote Company
1708 Bowling Green Building
New York

Avoid misrepresentation—
even though it be unintentional.
Look for this label on
tops represented as *Pantasote*



HALF-TON TRUCK



The Only Light Delivery Car with the
Counterbalanced Crankshaft Motor



The Rush
Counterbalanced
Crankshaft



The
Unbalanced
Crankshaft



When You Demonstrate

with a Rush you can throttle the motor down to three miles an hour on high in traffic or you can take the worst hill in your town with never a knock or a jerk. You have stupendous power hooked up with silken flexibility. You have

prolonged life and marvelous economy in gas and oil consumption.

You can race the Rush motor and stand a pencil upright on the radiator.

These are claims — now for the proof.

You know that vibration, unbalanced power, uncontrolled distortion is the bane of the existence of every automobile engineer.

In the field of high-priced pleasure cars the problem has been partially solved by multi-cylinders—overlapping power impulses. But the expense of more than four cylinders in a light delivery truck is absolutely prohibitive.

Rush engineers have eliminated vibration by the adoption of the counterbalanced crankshaft motor.



CHASSIS
\$895

EXPRESS BODY
\$965

Next time you pass a railway locomotive take a look at the drive wheel. Opposite the connection between the drive shaft and the wheel itself—on the other side of the hub—you will see a massive weight. If this weight—in perfect balance with the weight of the opposite side of the wheel—were eliminated you can readily see what would happen. With every power impulse the wheel would jerk until the next impulse pulled it over again. The weight absorbs this jerk and by its own momentum applies driving power until the engine provides another pull, through the drive shaft. (See page one of this insert.)

The average pleasure car motor, and all delivery car motors save only the RUSH, are racked by this same jerking every time power is applied to the crankshaft.

Logically, this means distortion—it means a ton of uncontrolled power is loose in the motor tearing and grinding at every moving part.

This vibration is "synthetic" or cumulative, i. e., the jerk comes every fourth or fifth turn of the crankshaft.

The reaction from this jerk resists the motor power. Resistance of every kind must be overcome by using additional fuel—and gasoline costs real money these days.

The distortion, the unbalanced power, means friction. The more friction, the more oil consumption. Distortion, vibration, loose power cause wear and tear—*high repair bills.*

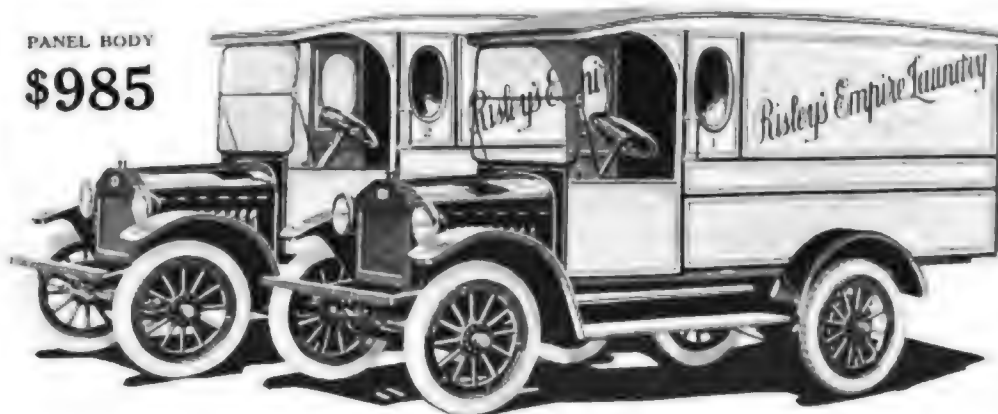
This is a matter of dollars and cents to you because it is the star feature of a list of selling points that are absolutely exclusive to the Rush.

Such a combination of sales material has never before been offered to dealers in a light delivery truck.

Read the specifications on the next page and write for our literature and liberal dealer proposition.

Rush dealers are making fast money everywhere.

PANEL BODY
\$985





Specifications

MOTOR: RUSH 3¼-inch bore, 5-inch stroke; developing 29 H. P. at 1600 R.P.M. Four-cylinder monobloc L-head type—three-point suspension—unit power plant, counterbalanced crankshaft.

STARTING AND LIGHTING: SPLITDORF two-unit system, especially designed for delivery car service. Simple—efficient—compact—weather-proof. SPLITDORF "D'Arsonval" type—15-0-15 range ammeter, positively indicating generator charge rate and lamp and horn discharge.

IGNITION: CONNECTICUT distributor—WILLARD 6-80 storage battery.

OILING: Automatic constant level pump and splash oiling system.

CARBURETOR: CARTER clear glass float chamber with Carter easy starting dash adjustment.

RADIATOR: Vertical tubular, with expansion tank. Capacity, 5 gallons. Armored, fin-type removable casing.

CLUTCH: BORG & BECK 8-inch dry plate multiple disc clutch. No "stuttering" nor "grabbing."

TRANSMISSION: COVERT, Model "LB"—selective sliding gear type—three speeds forward and one reverse—center control—extra long levers—40 H.P., special truck design, with oversize gears. All gears high-grade, heat-treated alloy steel. Roller bearings.

UNIVERSAL: 40 H. P. Universal, double-yoke type, with special RUSH strain-relieving ball thrust yoke.

DRIVE: Hotchkiss drive, bevel gear type. Straight line from unit power plant through universal joint.

FRONT AXLE: LIGGETT drop-forged "I"-beam section, with specially designed hubs.

REAR AXLE: Three-quarter floating type—six points of adjustment. BROWN-LIPE differential—chrome-nickel steel shafts, specially treated—taper roller bearings.

BRAKES: Internal expanding—external contracting—operating on rear axle drums, 14-inch x 2-inch ASBESTOS-faced.

SPRINGS: Semi-elliptic—front, 34-inch x 2-inch; rear, 48-inch x 2-inch. Silico manganese steel, eliminating all distortion.

SHOCK ABSORBERS: Pneumatic air check type, designed to absorb rebound without carrying load.

STEERING GEAR: LAVINE heavy-duty truck steering gear; irreversible split nut type.

FRAME: BRILL, pressed steel channel section—flexible type, 3½ inches deep, 2¼ inches wide, 5-32 inch thick. All cross members pressed steel, hot riveted, with integral gussets.

WHEELS: 30 inches front and rear, extra heavy—1½-inch spokes of selected hickory, fitted with demountable rims.

TIRES: UNITED STATES 31 x 41 all-round plain-tread front—chain-tread rear.

GASOLINE TANK: Capacity, 10 gallons.

WHEELBASE: 105 inches—tread 56 inches.

GASOLINE MILEAGE: 20 to 25 miles per gallon—oil, 600 miles per gallon.

LOADING SPACE: 72 inches back of driver's seat.

EQUIPMENT: GRAY & DAVIS electric, double-bulb head lights and tail light, electric horn, bumper, jack, tire pump, tool kit and extra rim.

BODIES: Fore-door panel; weight, 1950 pounds—fore-door, six-post express; weight, 1850 pounds—equipped with windshield, tire rack and rear fenders.

RUSH MOTOR TRUCK CO.

PHILADELPHIA



As Clear as Daylight

The human eye is made to see by sunlight.

Sunlight is diffused—It spreads a clear even light over all objects.

MORE LITE AUTO LENS

is made to suit the human eye. The light they throw, while not so intense, is diffused as the sun's is.

Every object stands out as clearly with a MORE-LITE AUTO LENS as it does in the daylight.

There is no glare with MORE-LITE AUTO LENS.

There is no danger from accidents—with a MORE-LITE AUTO LENS.

There is no danger breaking headlight laws with a MORE-LITE AUTO LENS.

MORE-LITE Auto Lenses fit any lamp. They can be installed easily and without cost.

By their attractive appearance they add to the beauty of your car.

They are the most reasonably priced lenses for their quality on the market.

Dealers find More-Lite Auto Lens is a quick seller.

PRICES

7	to	8½	crystal	\$1.50	per pair;	amber glass	\$2.00
8½	to	9½	crystal	1.75	per pair;	amber glass	2.25
9½	to	10½	crystal	2.00	per pair;	amber glass	2.50
10½	to	11½	crystal	2.25	per pair;	amber glass	3.00

Write for liberal discounts.

L. E. Smith Glass Co. Mount Pleasant, Pa.



When Writing to Advertisers, Please Mention Motor Age



This 1909 Buick owned by F. E. Slason, Plainville, Kansas, has been driven a greater distance than any other automobile has ever been known to go. Official figures give it the astounding record of 261,800 miles—a distance equal to ten times around the world. The illustration shows the "Hyatt Roller" starting from the Detroit Athletic Club on the first lap of its long mileage grind.

The World's Long Distance Car on Another Mileage Marathon

June 4th, this 1909 Buick—still equipped with its original Hyatt Bearings and re-christened "The Hyatt Roller"—left Detroit to make this circuit of the country.

After eight years of severe service—equal to thirty years of normal wear—its Hyatt Bearings are running as smoothly as the day they were installed. They show you the continued and unvarying satisfaction you will get from Hyatts in your car.

They are still capable of withstanding the shocks and strains of rough roads and mountain grades. They demonstrate that whatever your local conditions, you will always get the same quiet, carefree satisfaction that distinguish Hyatt Bearings everywhere.

The very age and past record of this veteran automobile make its present performance that much more significant. That is why we are putting it to the test—sending this world's long distance car on this new mileage marathon.

In the results of this tour coast to coast and back again, you will find the reason for making sure that your new car is equipped with Hyatt Quiet Bearings.

HYATT ROLLER BEARING COMPANY, Detroit, Michigan



In 1917 this same car, rechristened the "Hyatt Roller" is making a 12,000 mile trip, coast to coast and return, to test still further its original set of Hyatt Bearings.

It goes by way of Detroit to

Cleveland	San Francisco
Buffalo	Portland
Albany	Seattle
Boston	Spokane
New York	Butte
Philadelphia	Omaha
Pittsburg	Des Moines
Indianapolis	Minneapolis
St. Louis	Milwaukee
Denver	Chicago
Salt Lake City	

and back to Detroit.

Its coming, and arrival in various cities, will be announced in local newspapers. If you are on the route, watch for the "Hyatt Roller".



HYATT

The Bearing that Proves its Quality by Performance on the Road

When Writing to Advertisers, Please Mention Motor Age

Read What This User Writes

AUTO LIQUID VENEER



Buffalo Specialty Co..
Buffalo, New York.

Gentlemen:-

Gentlemen:-

My experience with AUTO LIQUID VENEER and spraying equipment prompts me to volunteer the statement that it is a most practical and valuable article. The quick and easy way that it takes off dirt and mud spots and leaves a brilliant, rich, lasting polish is almost magic. Melted snow and dried rain does not seem to dull the L-V polished surface of the car as it does just the untreated varnish, but the water seems to slide or run right off and carry the dirt with it.

... parts are, also, L-V ... to resist

If nickeled parts are, also, T-V treated in the same way, they seem to resist the staining or oxidizing effect of rain and snow, and better retain a brilliant polish even through the worst stormy weather.

Those who do not use it are really missing something that not only improves the looks of the car but saves many a dollar-and-half for washing.

Very truly yours,

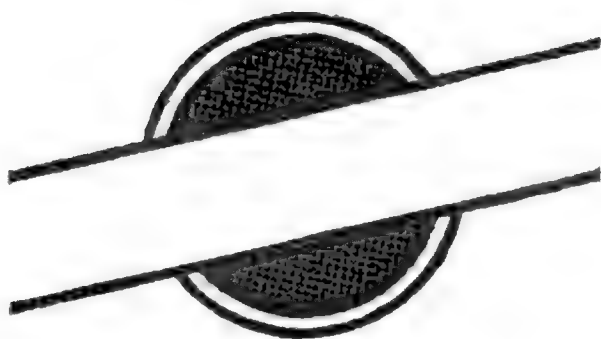
yours,
A. G. Galt



*Just One
of
Thousands*

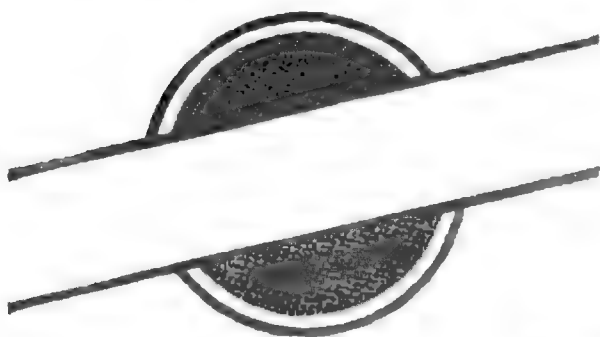
COMPLETE OUTFIT, \$1.25. At most dealers or sent direct for \$1.25 if dealer cannot supply. \$1.50 in Canada.

BUFFALO SPECIALTY COMPANY, Buffalo, N. Y., Bridgeburg, Ont., Can.

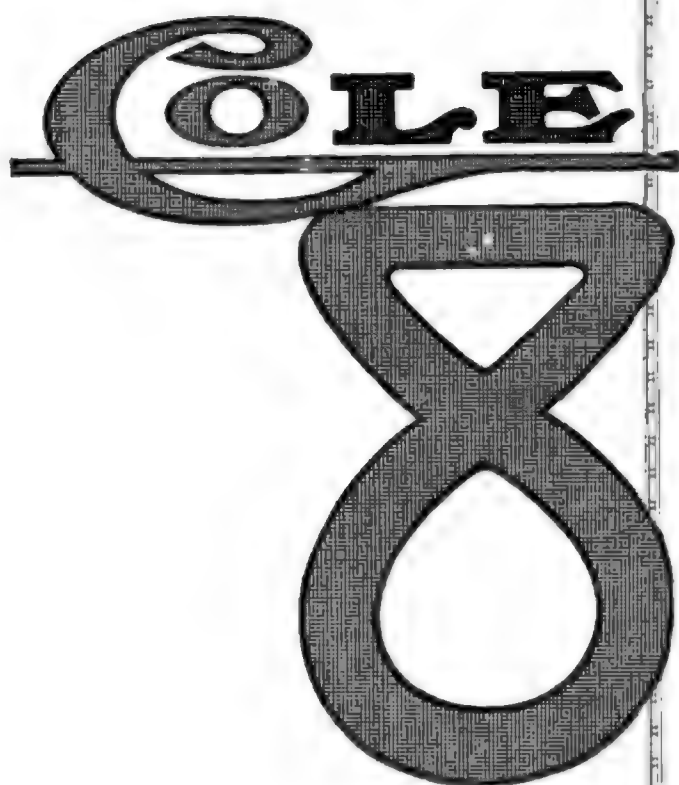


The South is
the fastest develop-
ing section of the
United States today—
and a most promising
one for dealers and dis-
tributors who handle
this nationally known
5-passenger car and one-
ton truck, both priced
at under \$800.

See announcement next week



For advance information wire or write
MOTOR AGE, 95 West Fort St., Detroit,
Michigan. Inquiries marked "Confiden-
tial" will be answered direct by MOTOR
AGE and so treated.



Something More

—for dealer—as well as for buyer

Most any motor car today is reasonably sure to go.

But it is in the *manner* of its going that the Cole Eight gives *something more*.

And this *something more* is just as great an asset to the dealer as to the buyer.

Quiet, well bred, handsome—the Cole Eight travels majestically.

Gear shifting is negligible. Comfort is everything.

The fatigue and tension of driving vanish. Real recreation takes their place.

Yet with all its power, all its flexibility, the Cole Eight out-economizes not only other cars of its type but many that are less powerful.

The Cole Eight is *more* than a mere automobile. It does *more* than merely go.

Such a car through its *something more* to the consumer becomes materially *something more* to the dealer.

There is an opportunity *now* for you to become a Cole Eight dealer if you measure four square.

Talk business with us.

Prices

Seven Passenger Cole Eight Touring Car	- -	\$1795
Four Passenger Cole Eight Roadster	- - -	\$1795
Four Passenger Cole Springfield Tour-Coupe		\$2295
Seven Passenger Four-Door Tour Sedan	- -	\$2495

f. o. b. factory
and subject to change without notice

Cole Motor Car Company
Indianapolis, U. S. A.



Here's a real tip from the tire man

How to save 40% a year on your tire bill

You don't want tire adjustments—you want mileage. You'd like to get 10,000 miles out of every tire you buy.

Very often you get less than the guaranteed mileage. Then you have to go to the tire adjuster and hand over good money. You aren't satisfied; neither is he.

Here is a tip from a tire man on how to avoid the adjustment nuisance, and get the most out of your tires.

He says: "If you keep your tires properly pumped *all the time*, you'll get about twice the average mileage."

At the very least you will save 40% on your tire bill.

Tire manufacturers say nothing ruins a tire faster than underinflation.

Why hand pump is inefficient

It is practically impossible to keep tires inflated to standard pressure with a hand-pump. It's hard, dirty work. Few men are patient enough to force sufficient air into their tires. Soft tires and low mileage always result.

How to keep tires properly inflated

You need not do back-breaking work to keep your tires properly inflated. For a little more than the cost of a hand-pump—for a small fraction of what underinflation costs—you can buy a Cassco Engine Driven Tire Pump.

99.2% factory built; not assembled

The Cassco Pump is *not assembled*; it is *actually built*. 99.2% of the pump is manufactured in the West Side Foundry Co. shops.

We save more than 25% because we do not have to pay profits on the various parts to several manufacturers. You get the benefit of these savings.

Designed by expert engineers

The Cassco Pump was designed by expert engineers. Simple and scientific in design. Takes up little space. Easy to install. Always ready for service. With one easy motion of your hand you can mesh or unmesh the gears. Never out of order.

Dry air; no oil spray

The air from the Cassco Pump is dry and clean. The new Cassco design of piston and cylinder prevents oil-spray. Oil ruins tires.

The Cassco Pump will inflate a 34 x 4 tire to 80 lbs. pressure in 90 seconds. Smaller tires take proportionately less time.

In ordering specify make, year and model of your car.

Put a Cassco Pump on your car today.

Constantly growing sales

DEALERS: Strong advertising and the merits of the pump are making the Cassco a big seller. We are using half page advertisements in the Saturday Evening Post, Literary Digest, Collier's and Leslie's with a combined circulation of 4,070,000.

We supply dealers with attractive store hangers and booklets for counter distribution. These sales helps enable you to identify yourself with the Cassco national advertising campaign. This means increased sales and extra profits for you. Do not miss this opportunity for extra profits.

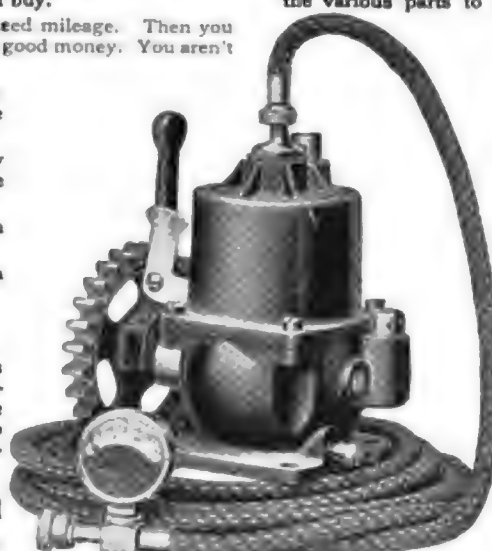
Write today for full information.

Sales Department

EDWARD A. CASSIDY CO., Inc.
Madison Ave. at 40th St., New York

Manufacturers

THE WEST SIDE FOUNDRY CO.



Complete with all fittings including finest gauge made. Easy to install. **\$10**

Special for Fords, \$8

Complete with all fittings including gauge. Easy to install.

CASSCO TIRE PUMP

The Factory-Built Engine Driven Pump

When Writing to Advertisers, Please Mention Motor Age

PERFORMANCE PROVES KELLEY TRUCK UNIT BEST



\$425.00

F. O. B. CHICAGO

Internal Gear Shaft Drive

The capacity for the kind of gruelling service described in this letter makes the Kelley the **BEST** Truck attachment for Fords to buy and the best to sell.

You know that chains are a dead issue—none so poor to do them reverence. No chain is guaranteed for one inch. Must be renewed every 5000 to 7000 miles. Constant expense. Undependable. And when chains break it is sure to be at a time when the truck is loaded.

Internal gear shaft drive combines highest efficiency with highest economy. Delivers maximum engine power direct to wheels. Fully guaranteed—efficiency increases with use!

Kelley Truck Unit is easiest to attach to Ford Chassis. Replaces entire Ford rear system with full truck construction, giving whole rear system of Ford for salvage. Long wheel base; maximum loading space.

1 Ton Model—\$425.00

Guaranteed for 3000 pounds on spring pads. Wheel base: 127"; frame length: 174"; wheels: fourteen 2" spokes; Tires: 32x3 1/4 solid of standard make fully guaranteed by makers.

1 1/2 Ton Model—\$485.00

Guaranteed for 4250 pounds on spring pads. Wheel base: 135"; frame length: 194"; wheels: fourteen 2" spokes. Tires: 32x4 solids of standard make fully guaranteed by makers.

SOME GOOD TERRITORY STILL OPEN.

Write for Dealers Terms at Once

Kelley Convertible Auto-Truck Co.

334 So. Michigan Ave., CHICAGO

*Read this letter from
one of our Alabama
Distributors:*

"The writer just returned from a trip through the graphite fields of Clay County.

"There was a constant down-pour of rain for thirty-six hours and roads were considered unpassable, but we got through just the same, making an average of eight and one-half miles an hour.

"We have never seen a better performance and are convinced that no other truck would have made this trip under existing conditions.

"Should anyone want to know what the Kelley Unit will do where there are absolutely no roads and nothing but mud and mountains to run over, you may refer them to us."

\$1195 F. o. b.
Racine

Price will be advanced to \$1230 on July 1st

Mitchell Junior—a 40-h. p. Six
120-inch Wheelbase

Mitchell
SIXES

\$1460 F. o. b.
Racine

Price will be advanced to \$1525 on July 1st

7-Passenger—48 Horsepower
127-inch Wheelbase

2 Sizes—8 Bodies

Hundreds of Extras

Note what a mammoth field the Mitchell line now covers.

Two sizes of Sixes—\$1195 and \$1460. Both of them larger than rivals.

All styles of bodies, including a unique Club Roadster, a fine Cabriolet and a Convertible Sedan.

And hundreds of extras, to give them distinction over like-class cars.

Unique Attractions

The latest Mitchells offer

31 Extra Features—

24 Per Cent Added Luxury—

100 Per Cent Over-Strength

That is, 31 features—like a power tire pump—most of which all other cars omit. No other car has more than four of them.

An addition this year of 24 per cent to the luxury cost, paid for by savings in our new body plant.

And a doubled margin of safety.

From 50 per cent we have now increased it to 100 per cent over-strength.

Extra Values Free

The Mitchell gives at least 20 per cent extra value over any other car in its class. In large part it comes in things people can see.

This is all due to factory efficiency. To a plant and equipment built under John W. Bate. To methods which have cut our factory costs in two.

Out of those savings we spend mil-

lions of dollars to give the Mitchell attractions which others lack.

Everybody Knows

Every possible buyer is going to know these facts. Last year we spent \$700,000 in advertising. This year we are spending \$1,000,000. The Mitchell is now the best-advertised fine car ever brought out in America.

The Mitchell has done what others must do to meet coming competition. We have reduced factory cost to the minimum. We built practically all of the car—including the bodies—under Bate efficiency methods.

We have multiplied our output 2½ times over in the past six months.

All who are interested in such a car—as dealers or buyers—are urged to investigate.

MITCHELL MOTORS COMPANY, Inc.
Racine, Wis., U. S. A.

TWO SIZES

Mitchell—a roomy 7-passenger Six, with 127-inch wheelbase and a highly-developed 48-horsepower motor.

\$1460

Price will be advanced to \$1525 on July 1st.

Four Passenger Roadster, \$1485. Sedan, \$2175. Cabriolet, \$1895. Coupe, \$1995. Also Town Car and Limousine

Mitchell Junior—a 5-passenger Six on similar lines, with 120-inch wheelbase and a 40-horsepower motor. ¼-inch smaller bore.

\$1195

Price will be advanced to \$1230 on July 1st.
All Prices f. o. b. Racine



When Writing to Advertisers, Please Mention Motor Age



Big Profits from This Fan Belt for Fords

Here's a Fan Belt for Fords that sells at a remarkably low price—TRIPLE STITCH—a fan belt made of two plies of oak-tanned leather stitched with three rows of waxed linen thread—a fan belt that offers you unusual possibilities of profit.

Triple Stitch

Fan Belts for Fords

are but one of a line of Fan Belts for Fords pictured and described in our new 1917 catalog, now ready to come to you. There are WETPRUFE Fan Belts for Fords—the best fan belts we know how to build after almost fifty years of experience. Then there are FLATGRIP Fan Belts for Fords—made of special fan belt leather and selling at a moderate price. And finally comes TEXTFORD—a durable, all-textile Fan Belt for Fords.

In addition to Fan Belts for Fords, there are fan belts for all cars, flat "V" and round fan belting in rolls, clutch facings and other dependable automobile materials.

All have back of them the endorsement of leading automobile manufacturers—and will fully satisfy your customers.

DEALERS: Write for our catalog, with name of jobber nearest you.

JOBBER: Write now for catalog with details of our special proposition to you.

Catalog sent free and gladly. Write now.

HIDE, LEATHER & BELTING CO.

227-A S. Meridian St.

Indianapolis, Ind.

TEAR OFF AND MAIL

Gentlemen: Please send me your new 1917 catalog with name of jobber nearest me. I am particularly interested in the items checked below.

- | | | | |
|--|--|--|--|
| <input type="checkbox"/> Flat Fan Belting | <input type="checkbox"/> "V" Fan Belting | <input type="checkbox"/> Made-up Fan Belts | <input type="checkbox"/> Rawhide Lacing |
| <input type="checkbox"/> Round Fan Belting | <input type="checkbox"/> Made-up Fan Belts for Fords | (all cars) | <input type="checkbox"/> Flexible Metallic Tubing |
| | | | <input type="checkbox"/> Crank Holders, etc., etc. |

Name.....

Address..... M.A. 6-28

When Writing to Advertisers, Please Mention Motor Age

Ball Bearings cost
more initially — but
they save you car own=
ers money.



U.S. Ball Bearing Mfg. Co.

Conrad Patent Licensee

CHICAGO



ILLINOIS

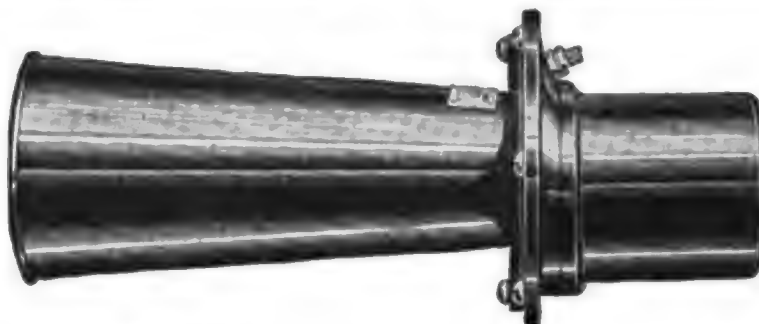
When Writing to Advertisers, Please Mention Motor Age

SPARTON PRODUCTS

First Choice of America's Best Cars



**SAFETY
FIRST
SOUND
SPARTON**



From a Whisper to a Whoop!

Country or city, day or night, the Sparton Motorhorn provides an adequate and appropriate warning signal.

Its voice may be modulated from the far-flung "Ya-hoo-ta" needed on the winding country road, to the courteous "Passage, please," of the city street crossing.

Forty-two leading motor car manufacturers use the Sparton as standard equipment.

The Sparton Gasoline Vacuum System defeats gravity and automatically feeds gasoline to the carburetor to meet any demand. In one test it raised gasoline 22½ feet; in another it delivered a steady, even supply of gasoline to a motor with 442 cubic inches displacement while running a car at 68 miles an hour.

We assure manufacturers of prompt deliveries.

THE SPARKS-WITHINGTON COMPANY

JACKSON, MICH., U. S. A.

Motorhorns

Gasoline Vacuum Systems

Radiators

Radiator Fans



(69)

When Writing to Advertisers, Please Mention Motor Age

SUNDERMAN

Vacuum Carburetor

\$5

Newburgh
F. O. B.

\$6.50 for
other than
Ford or Metz

*Installed on 138
DIFFERENT makes of
cars—on thousands of
motors—and making
good on every one.*



"It Has Everything"

The Sunderman Vacuum Carburetor possesses every attribute of the ideal carburetor. Everything that the most expert driver or the rawest amateur could require is present in good measure.

ECONOMY is given in so great a degree that we hesitate to print the average gains from records made by owners who have written in to us. We content ourselves with saying that *the buyer is warranted in expecting from 30 to 50% saving in fuel.* Remember, we say that claim is conservative.

You Can Prove It Yourself

POWER, the chief desire of every motorist and every engineer, is unbelievably increased. Taking hills on high that other cars find difficulty in negotiating on second or third speed, the Sunderman will go up and over with a pick-up and a burst of speed that will make an owner proud of his car, whether it is a Ford or a Packard.

SPEED—and every man wants it, if only occasionally—can be gotten with a Sunderman carburetor that the car's maker never built into his motor. You won't inhale the other fellow's dust if you use a Sunderman carburetor.

It is as **Flexible as Steam**—enabling a car owner to throttle to a creeping pace, *even on a hill*, and to run back and forth at will over a variation of speeds that is nothing less than remarkable.

If there were any way of saying the above more strongly or sincerely, we should say it to you now—and keep on saying it.

Many thousands of car owners and dealers have already proved these statements for themselves. Every mail brings letters of enthusiastic appreciation from private owners and the trade.

The demand is so great—sales so large—and requests for deliveries so urgent—that we have just opened our own foundry to increase our supply of castings.

We want every dealer in the United States to share in the profits that come with Sunderman success.

Write us at once for our proposition—Every owner in your town will give you a profit

Sunderman Corporation
11 Chambers Street Newburgh, N. Y.
Western Office: 403 Kresge Building

Multi-Power

Dominates Light Car Selling

One thing *stands out* in the mind of today's light car buyer—**Multi-Power!**

He knows it gives the *power-smoothness* of high-priced multiple cylinder cars in a fine custom-built automobile, roomy and balanced at \$845.

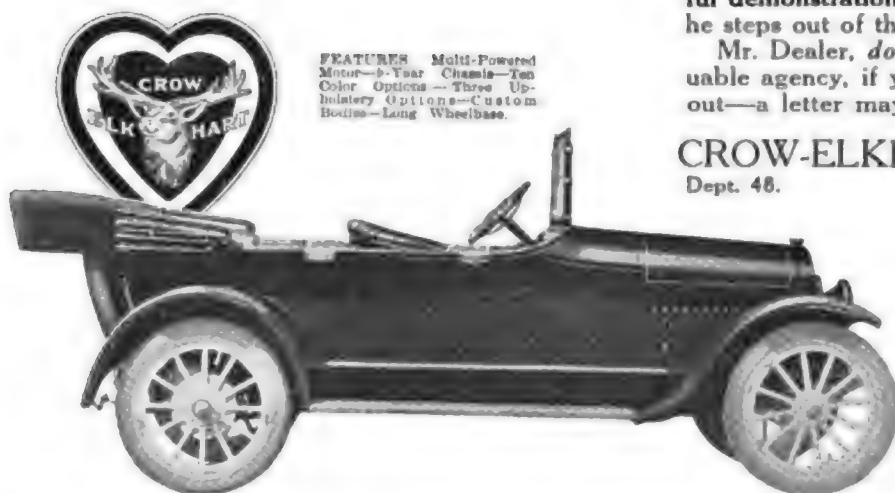
He knows that exclusive Crow-Elkhart construction is responsible for Multi-Powered motoring—that there is *no substitute* for it.

Demonstrations Make Quick Sales

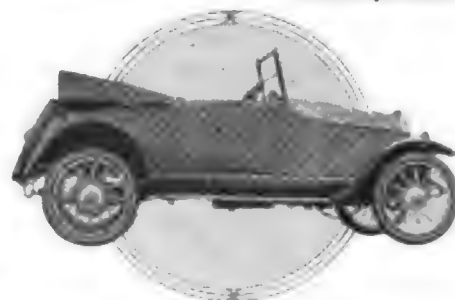
The Multi-Powered car gives your prospect a wonderful demonstration—enthuses him—gets his order before he steps out of the car!

Mr. Dealer, *dominate* your territory. Secure this valuable agency, if your district is still open. Wire to find out—a letter may not arrive in time.

CROW-ELKHART MOTOR COMPANY
Dept. 46. Elkhart, Indiana

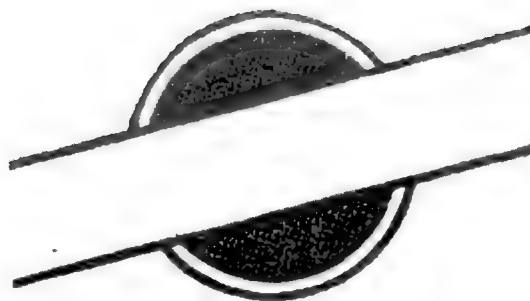


FEATURES Multi-Powered
Motor—8-Year Chassis—Ten
Color Options—Three Up-
holstery Options—Custom
Bodies—Long Wheelbase.



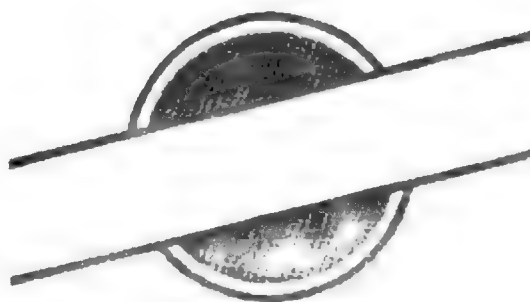
Crow-Elkhart
Multi-Powered Car **\$845**

When Writing to Advertisers, Please Mention Motor Age



There are good
dealers in towns of
25,000 population
who with this line
have the chance to
become *big distributors*
in towns of over 100,000.
Possibly you may be
hiding your light under
a bushel.

See announcement next week



For advance information wire or write
MOTOR AGE, 95 West Fort St., Detroit,
Michigan. Inquiries marked "Confiden-
tial" will be answered direct by MOTOR
AGE, and so treated.

**A Flood of
Soft Light**

**Legal
Anywhere**



**Now On
400,000
Cars**

**Adopted by
17 Car
Makers**

400,000 Cars Like These Are Selling Warner-Lenz

Consider these facts—you who seek to handle things that motorists want.

The Warner-Lenz has already won 400,000 motorists. And every one of these cars, by every hour of night driving, is proving the need for this lens.

All the new cars of 17 famous makes now go out equipped with Warner-Lenz.

Over 7 million ads every month go out to convert the shaft-light users. And the result every month is some 65,000 new pairs of Warner-Lenz on the roads.

Get the Profit

Here is the sensation of the day in motor car equipment. It is the largest-advertised accessory in this field. Its first-year sales have broken every record among motor car improvements.

Over 3 million cars now running need the Warner-Lenz. Thousands of new cars are still going out without them.

They require little room in a store, small investment,

no after-service. What accessory do you know which compares with this as a big, easy profit-maker?

Why Warner-Lenz?

Warner-Lenz avoid the glare, which traffic laws forbid, without the use of dimmers.

They light the road, the roadsides and the turns, both far and near. There are 176 lenses in one. The whole angle of vision is made as clear as day.

The light is the same in any position. Turning of the lens in the door of the headlamp does not affect it, nor does rise and fall of the car. That is vitally important.

Some sixty types of lenses have been suggested for this purpose. But the Warner-Lenz is the only one which meets all these requirements.

Its wide adoption—both by makers and owners—proves it the coming lens. Write for our dealer proposition and our methods of fostering sales.

Standard Equipment On

PACKARD	BIDDLE
MARMON	HAL TWELVE
STUTZ	SINGER
WHITE	McFARLAN
PEERLESS	OHIO ELECTRIC
FIAT	DANIELS 8
FAGEOL	PATHFINDER
LENIX	DOBLE STEAM
	CUNNINGHAM

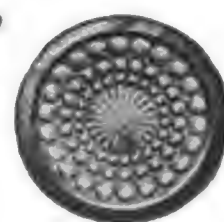


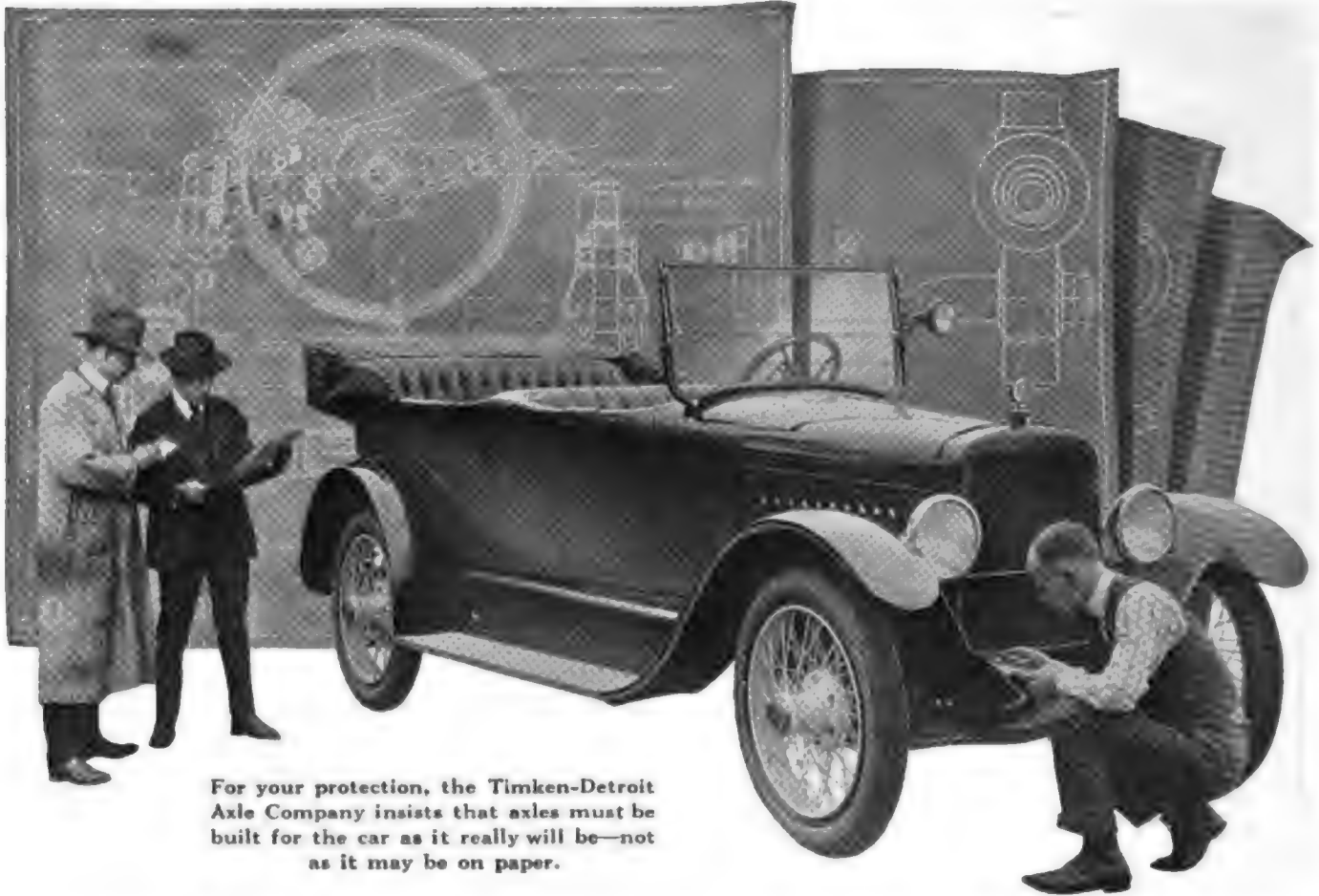
WARNER-LENZ

*This is A. P. Warner, of the Warner Auto-Meter Fame, and
Inventor of the Magnetic Speedometer.*

THE WARNER-LENZ COMPANY

916 So. Michigan Avenue, Chicago





For your protection, the Timken-Detroit Axle Company insists that axles must be built for the car as it really will be—not as it may be on paper.

Does the Car Agree with the Blue Prints?

Car builders who use Timken-Detroit Axles cannot include them merely to furnish a selling point; *they must be built in*—not tagged on.

Therefore, in order to make sure that the car and the blue prints agree, the Timken-Detroit Axle Company insists upon knowing—

First, the weight of each model and type of car into which Timken-Detroit Axles are engineered.

Second, the size and power of the motor.

Third, the distribution of weight on the chassis, front and rear.

Fourth, all other details of construction which in the slightest degree affect the satisfactory service the car owner expects from Timken-Detroit Axles.

Further, the Timken-Detroit Axle Company will not contract to deliver motor-car axles except on definite assurance from the car builder

that the car on the street will carry out the promise of the car on paper.

Otherwise, it would be impossible to provide the necessary strength for emergencies, with ample margin of safety to protect you on the roughest roads even to the last mile of many years' service.

The car-builders who use Timken-Detroit Axles could buy other makes at a lower price and under less rigid restrictions, *but they willingly pay more in order to give you that extra assurance of safety, satisfaction and service.*

And that gives you a very good reason to believe that they have been especially careful in selecting *other parts of their cars*—and that these parts are properly co-related and equal in strength and fitness to the work they have to do.



THE TIMKEN-DETROIT AXLE CO.

Detroit, Mich.

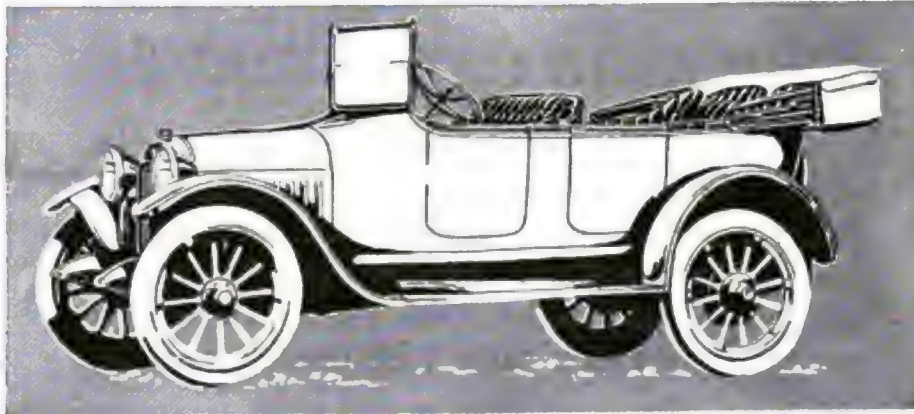


TIMKEN-DETROIT AXLES

When Writing to Advertisers, Please Mention Motor Age

Inter-State

AN EXTRA VALUE CAR



You actually save money if you buy this car now

Extra value as expressed in the Inter-State is due to three good reasons:

First. The Inter-State has been, and is being built on a principle which demands the perfection of one design and strict adherence to that design. This means savings in excessive overhead expense—absorbing high tool charges over a period of years—a steady growth in individual workmanship through familiarity with each operation of manufacturing.

Second. Success can be obtained in building one design for years only by the determination to have the design right in every respect from the outset—and the ability and resources to use materials of such high quality that the performance of such a car will

give satisfaction, and a high re-sale value after one, two or even five years' service.

Third. And the greatest reason for Inter-State extra value now—This established car—backed by years of satisfactory service—is offered you today—at no increase in price since the first of the year—because the materials used in the Inter-State were purchased before "war" prices went into effect.

Six Body Sizes

\$850

TO

\$950

We have a limited number of these "lower-cost" cars for distribution. Later, we will be forced to use materials at greatly increased prices.

We will never cheapen the quality to lessen the price.

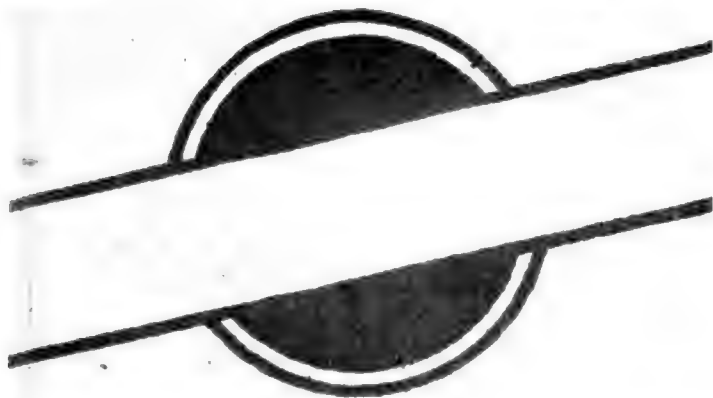
So remember—as long as these cars last—you, the buyer, save money—gain extra value—which we offer to prove to you can not be equaled at the price. Today, before you buy any other car, investigate the Inter-State.

WRITE FOR ILLUSTRATED CATALOG AND NAME OF NEAREST DEALER

INTER-STATE MOTOR COMPANY

Factory and General Offices

Muncie, Indiana



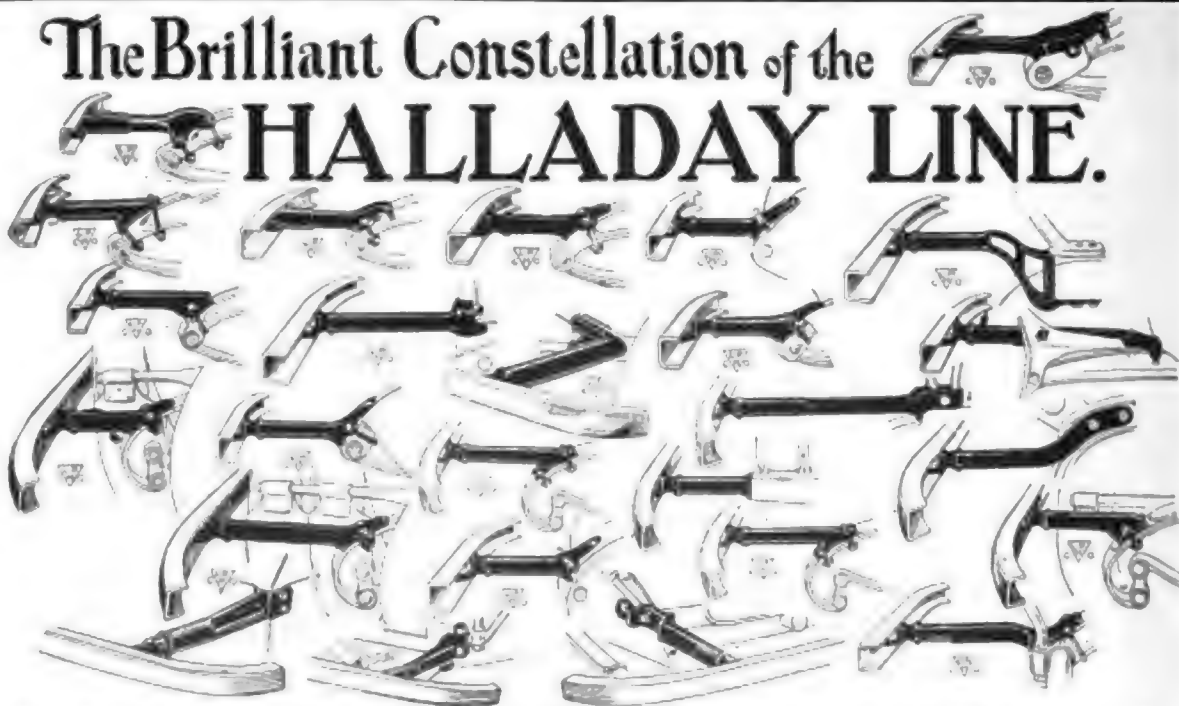
American Extravagance

is giving away to American thrift. More value per dollar expended is being exacted than ever before. This company's tremendous production guarantees quantity price together with quality value, consequently quantity sales with quantity profits.

See announcement next week

For advance information wire or write MOTOR AGE, 95 West Fort St., Detroit, Michigan. Inquiries marked "Confidential" will be answered direct by MOTOR AGE and so treated.

The Brilliant Constellation of the HALLADAY LINE.



MR. DEALER: In this galaxy of stars of the Bumper firmament you will find a bumper to fit every car on the road.

If you carry this line you can control the bumper business in your territory.

WRITE US OR THE NEAREST DISTRIBUTOR TODAY FOR FULL DETAILS OF THE MOST PROFITABLE ACCESSORY IN THE AUTOMOBILE FIELD

L. P. HALLADAY COMPANY, Streator, Illinois

DISTRIBUTORS:

Asch & Co., 18-24 W. 51st St., New York City.
Gray-Neath Co., 1440 Michigan Ave., Chicago, Ill.

Hughson & Merton, Inc., San Francisco, Los Angeles, Portland and Seattle, Pacific Coast Distributors.

E. L. Thompson Co., 317 Baystate St., Boston, Mass.
Sanford Brothers, Chattanooga, Tenn., Southern Distributors

When Writing to Advertisers, Please Mention Motor Age



Harvey RACING

SPRINGS DO NOT BREAK

WHEN your car is equipped with Harvey Springs it inspires you with more confidence—your mind is freed from worries about spring breakage and spring repair bills—you know your springs will withstand heavy strains and the sudden jars and jerks of rough, uneven country roads.

A spring that will break is too expensive for you, no matter how low the original cost. Why don't you equip your car with Harvey Springs?—the spring that has no weak spots—the spring that's **Guaranteed from End to End**—the spring without a single fault. If you break a spring and don't know where to get a Harvey replacement, just ask for the **Best Garageman in town**—he carries them or can get them quickly. Look for the name "Harvey" stamped on every spring—don't accept a substitute. Specify "Must Be Harvey."

The HARVEY SPRING COMPANY

858 17th Street, Racine, Wisconsin

Harvey RACING

SPRING SERVICE FOR OWNERS

Harvey Boltless Springs are made for all the leading makes and models of cars. Each Harvey Boltless spring is an exact duplicate of the original in size, shape, and every Specification. Harvey Boltless Springs can be quickly secured from progressive dealers, repairmen and garagemen in every section of the United States.

Harvey RACING

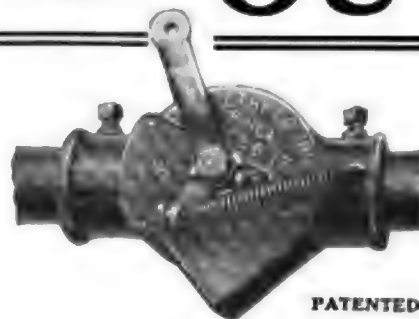
SPRING SERVICE FOR DEALERS

15,000 springs—600 different sizes—in stock at factory—ready for instant shipment. Over 50 large jobbing houses, covering every point in the U. S., carry complete stocks of Harvey Springs. Our Spring Book contains complete list of springs for over 600 different cars—shows sizes, weights, measurements, prices, etc. Write for a free copy and name of nearest jobber.

P E T R Y CUT OUT

"A real cut-out at last"—such is the opinion of every motorist who has tried the Petry.

Scientifically correct in every detail. Makes a positive cut-out through full-sized vent (the largest in the market) of megaphone shape, which materially increases the sound of exhausts. Positively no back pressure. Patented feature on control lever allows of seven adjustments, eliminating, in most cases, the use of pulleys. Easy to operate, easy to install. Spring so located as to be away from all heat. No strain on exhaust pipe. Each size accurately machined and fitted with set screw, making permanently rigid installation.



PATENTED

Sizes given are outside diameter of exhaust pipe

1½ inch to 1¾ inch, inclusive,	\$3.50 each
2 inch to 2¼ inch, inclusive,	4.00 each
2½ inch to 2¾ inch, inclusive,	4.50 each
2¾ inch to 3 inch, inclusive,	5.00 each

SPECIAL MODEL FOR FORDS, \$3.50
(Including Pedal and Chain)

JOBBER AND DEALERS: Write or wire at once. A handsome working counter display is sent with an order for 12 assorted sizes.

N. A. Petry Company, Inc.
1308 Race Street Philadelphia

DISTRIBUTORS:

Geo. L. Holmes, 1733 Broadway, New York City.
Grey-Heath Co., 1440 Michigan Ave., Chicago, Ill.
Hughson & Merton, Inc., San Francisco, Cal.; Los Angeles, Cal.; Portland, Ore.; Seattle, Wash.

"Out Again, Gone Again" with Basline Autowline

You can pull your car out of a ditch or mud hole on its own power—if you have a Basline Autowline.

Just fasten one end to a rear wheel, take a turn of the line around the hub, and fasten other end to fence post or tree. Then start your motor and—*sing!*—you'll be out of trouble in a second!

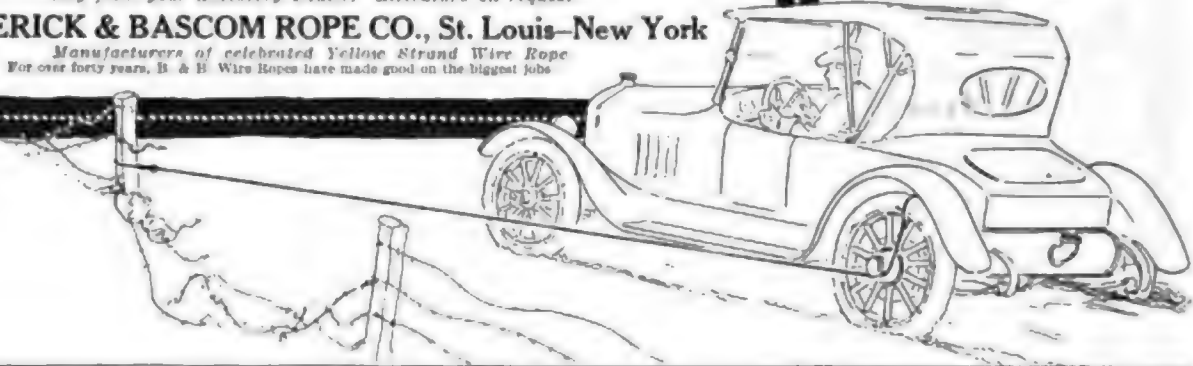
That's an extra use, of course, for Basline Autowline is made for towing. It's a length of **Yellow Strand Wire Rope** with patented **Snaffle Hooks** for attaching. The hooks *stay* hooked. Basline Autowline is light, powerful, durable, dependable. Price, east of Rockies, \$4.55.

POWERSTEEL AUTOWLOCK, another necessity, makes your car and spare tires theft-proof. Price, east of Rockies, only \$2.25.

Buy from your Accessory Dealer. Literature on request

BRODERICK & BASCOM ROPE CO., St. Louis—New York

*Manufacturers of celebrated Yellow Strand Wire Rope
For over forty years, B. & B. Wire Ropes have made good on the biggest jobs*



The Original Wire Rope Towline

ELCAR

The Elcar at \$845 Does Its Own Talking

A Few Elcar Specifications

Wheel Base—As long as some cars selling up to \$3,000 and more—115 in.

Motor—4-cylinder; long stroke; high speed; 34.7 h. p. at 1,800 r. p. m.

Fuel Supply—Stewart vacuum system.

Ignition—Delco automatic spark advance with manual control.

Starting and Lighting—Dyneto two-unit; double-bulb headlights; Willard storage battery.

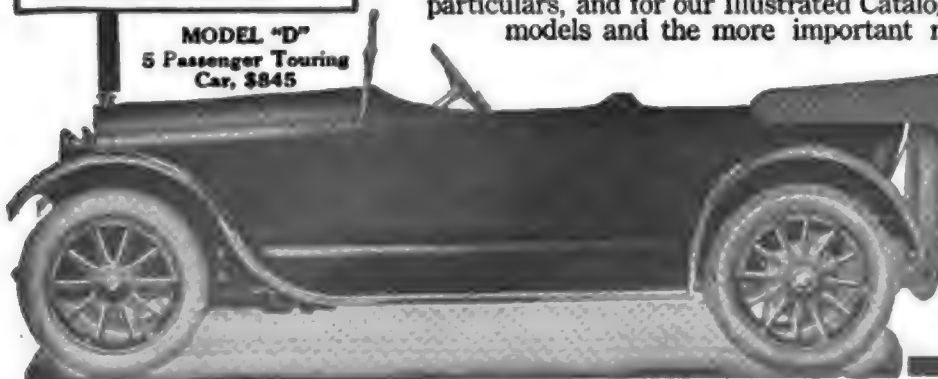
Clutch—Dry multiple disk—seven plates, steel on Raybestos.

Rear Axle—Full-floating with roller bearings at each end of wheel hubs.

Differential—Spiral bevel driving gears, with roller main bearings and ball thrust bearings.

Brakes—Internal and external, two inches wide on 12-inch drums.

MODEL "D"
5 Passenger Touring
Car, \$845



Looks better than its price, and is just as good as it looks. A car of distinctive beauty, well designed, well built, well finished—a car in which quality speaks right out.

Three Models at One Price

Five Passenger Touring Car Four Passenger Touring-Roadster
Two Passenger Roadster

Secure it for your territory We want to place our proposition before live dealers in territory not already assigned. Write us for particulars, and for our Illustrated Catalog showing all ELCAR models and the more important mechanical parts, and describing the construction of the ELCAR even down to its small details.

Elkhart
Carriage & Motor
Car Company

6781 Boardwalk Avenue
Elkhart, Indiana

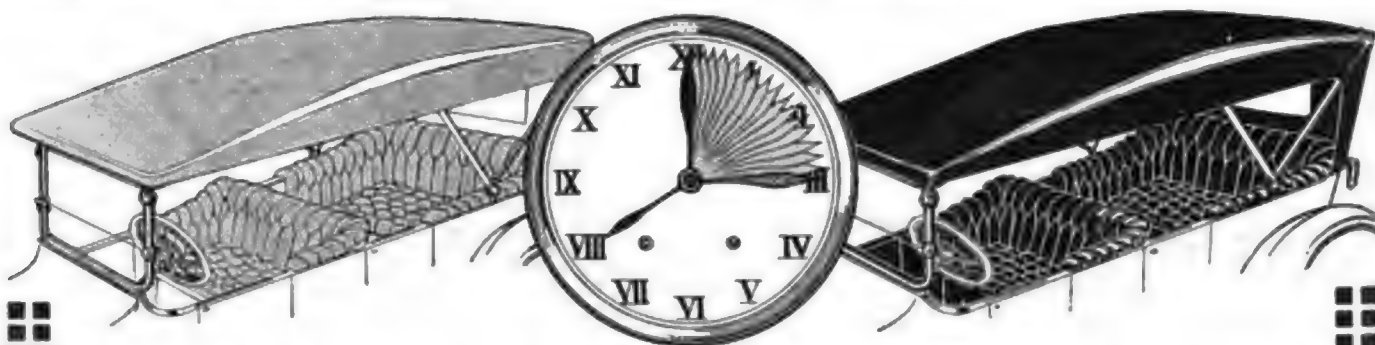
When Writing to Advertisers, Please Mention Motor Age

80% of all cars are used partly or wholly for business. Economy is demanded of the business car. Big gasoline, oil and tire bills show up disagreeably in the expense record. The light weight, big gasoline and tire mileage of this company's cars is a forcible sales factor.

See announcement next week



For advance information wire or write MOTOR AGE, 95 West Fort St., Detroit, Michigan. Inquiries marked "Confidential" will be answered direct by MOTOR AGE and so treated.



ONLY 15 MINUTES TO DRY!



Apply LEATH-R-NU to your dingy top and cushions with an ordinary brush. Lay the brush aside at 8 o'clock. At 8:15 take a spin in your old car made new—top and upholstery a rich, lustrous black, as bright and fresh-looking as they were originally.

Not a day wasted. Not even an hour. Just 15 minutes after its application, LEATH-R-NU is dry. LEATH-R-NU spells 1917 to 1918 car owners. It freshens, beautifies and preserves Leather, Mohair, Pantasote and all other leather imitations. Keeps them soft and pliable. Oil, gasoline or water have no effect on LEATH-R-NU. It never gets soft or sticky in warm weather. Will not crack or peel.

Use WATERPROOF MOHAIR TOP DRESSING for leaky Mohair tops. It dyes black while waterproofing. At your dealer's.

DEALERS: Order LEATH-R-NU from your jobber. Write him now for prices and full details.

LEATH-R-NU is also fine for refinishing tire coverings, auto trunks, traveling bags; for making brass lamps black, and covering up scratches in the enamel on your car. Use it on anything leather, imitation leather, mohair or metal.

All Auto Accessory, Hardware, Harness and Paint Dealers have LEATH-R-NU in five sizes—one-half pint to one gallon. Get a can today.

LEATH-R-NU

NOTE: If your dealer cannot supply you with LEATH-R-NU, use this coupon and we will send a can direct to you.

Nu-Back Mfg. Co.,
Dept. C, 114 No. Commercial St.,
St. Louis, Missouri.
Enclosed find \$1.25 for which please send me a full quart can of LEATH-R-NU.
Name.....
Street No..... City..... State.....
My dealer is.....

When Writing to Advertisers, Please Mention Motor Age



DRIDEK Makes a Remarkable Automobile Top

Smooth, pliable, and absolutely waterproof; wears well and looks well; stands up under hard and continuous service.

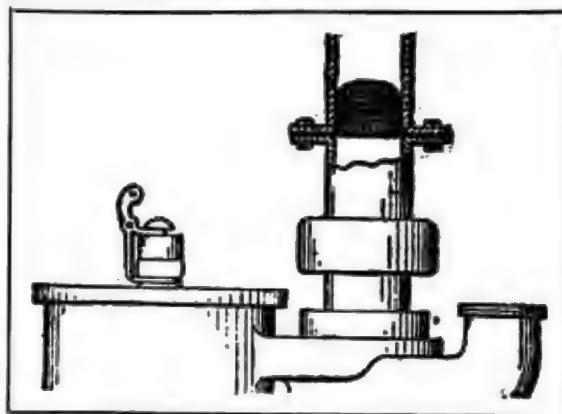
When you put up a DrideK Top—it is something to be proud of.



BULL DOG QUALITY in Rubberized Fabrics and Rubber Cloths, offers an opportunity for the finest automobile tops, curtains and upholstery.

Send for samples and price lists.

L. J. MUTTY COMPANY
BOSTON, MASS.



Solve the Problem of Vaporization

with an

ECLIPSE VAPORIZER

A mechanical means of breaking up the globules of gasoline which would otherwise resist diffusion in the air, causing waste of power.

Complete vaporization means that all the gasoline in the charge explodes and generates power.

The Eclipse Vaporizer is inserted above the carburetor between the carburetor flange and the intake manifold.

It is guaranteed to—

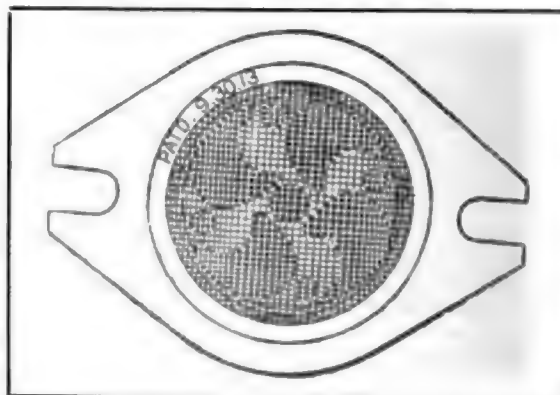
- Save 25% gasoline.
- Eliminate danger from backfire.
- Reduce carbon formation.
- Increase power, flexibility and smoothness of your engine.

It costs \$3.50 complete. It is returnable if not satisfactory.

Send us the price with diameter measurement of your carburetor.

Dealers, write for information

ECLIPSE MACHINE CO.
ELMIRA, N. Y., U. S. A.



Three Great Friends of Motorists

—from the G. A. C. line.

Combining economy,
utility and comfort

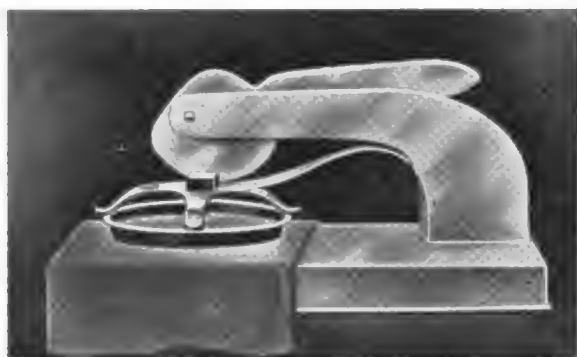
G. A. C. Accelerator Foot Rest

Sudden, continuous lunges on the accelerator result in hardship on the motor and tired, aching legs. The G. A. C. foot rest eliminates any such possibilities. It assures you a constant, even flow of power, a definite saving of gasoline and increased comfort during long drives. **\$1.25**



G. A. C. AUTO TIRE KIT

Every puncture leaves a hole in your tire. Sand and grit will work through resulting later in a blowout. With the G. A. C. Tire Kit you can easily and permanently seal any hole up to a quarter of an inch in the brief time it takes to vulcanize the inner tube. 5 small plugs and 2 large ones included in outfit. **\$2.00**

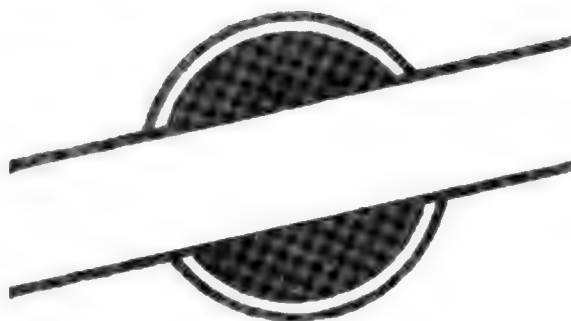


G. A. C. VULCANIZING CLAMP

With this outfit you can quickly and efficiently, permanently vulcanize your inner tubes, anywhere at any time, and at almost no cost. Simple, efficient and compact, it will pay for itself many times over. Patches for this clamp may be purchased from nearly all high-grade dealers in automobile supplies. Vulcanizer and 12 patches, complete, for. **\$2.25**

Send for catalog of other G. A. C. money savers

The General Appliance Co.
129 Federal Street Boston, Mass.



Dealers and
Distributors representing this concern have been uniformly successful—have made money—from the start. 90% recontracted last year. The reasons: volume-production, volume-prices, volume-profits.

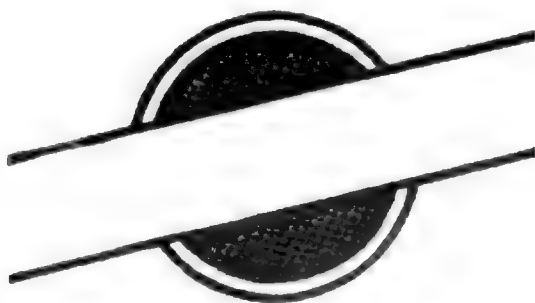
The opportunity for bigger business — bigger profits — with this concern today is more interesting than ever.

See announcement next week

For advance information wire or write MOTOR AGE, 95 West Fort St., Detroit, Michigan. Inquiries marked "Confidential" will be answered direct by MOTOR AGE and so treated.

5,000 dealers
and distributors
who are now
handling non-com-
peting products,
should with the ad-
dition of this car and
truck to their line be
able to multiply their
sales opportunities
and increase materi-
ally their *earning*
capacity.

See announcement next week



For advance information wire or write
MOTOR AGE, 95 West Fort St., Detroit,
Michigan. Inquiries marked "Confiden-
tial" will be answered direct by MOTOR
AGE and so treated.

Haywood's



Nationally
Advertised

Tire Repair and Vulcanizing Service

In these days of high tire prices, the tire repair busi-
ness is getting bigger and better than ever, as motorists
learn the method of true tire economy. Why not cash
in on this opportunity? Put in a Haywood Tire Repair
Plant. Link up with a nationally advertised tire repair
service. Six years of Haywood's advertising has
standardized the Haywood method.

The Sign of the Man and Machine

—is the connecting link between the tire repair man
and the automobile owner. It chains the established
trade of hundreds of customers to your business. It
connects your shop with a national tire repair service—
a standardized service—a service that motorists know
absolutely to be economical, practical and efficient.

The Haywood System

—is scientific—a true system of conservation of tires—
a system that saves motorists thousands of dollars on
tire bills. It means repairs that are lasting—vulcaniz-
ing that holds—repairs that are solid as the original
tire itself, insurance to motorists of no regrets on the
road.

Haywood's Tire Repairing and Vulcanizing Plants

The Haywood Plants are complete, all in one unit—are easily
operated—no experience necessary. Here is your opportunity
to make big money—to add hundreds of dollars in profits a year
to your business. Occupies only a small part of your shop—can
stand right out in the open where your customers can see it—a
constant reminder to keep their tires repaired. Your shop
equipped with a Haywood Plant is the motorist's logical haven
for tire repairing. It completes your service—a service that
customers like—a service that brings and holds business at big
net profits.

Write for New Catalog

Use a letter, or post card, or simply send the coupon below.
This brings the big book of facts—tells all about tires and how
to repair them—shows outfits in use—gives proof of success—
shows how we co-operate with plenty of advertising and plenty
of help—how you link up with a national service. Book gives
complete details. Write today. Don't delay.

THE HAYWOOD TIRE & EQUIPMENT CO.
720 N. Capitol Avenue Indianapolis, Ind.

Haywood Tire & Equipment Co.,
720 N. Capitol Ave., Indianapolis, Ind.

Gentlemen: Please send me full particulars of your national
service of tire repairing and complete catalog and information of
Haywood Tire Repair Plans.

Name

Address



A Radiator Shield that will outlast the car

(RED, WHITE AND BLUE)

A flag wears out, gets shabby, wet and be-draggled.

The ING-RICH Shield not only outlasts the car, but *remains bright and beautiful* through hard usage and all weathers.

"OLD GLORY" SHIELD

Made of heavy steel and porcelain enameled in red, white and blue. Size 4x4½ inches. Either mounted on the radiator cap, or attached to the front of the radiator itself, this beautifully finished porcelain enameled shield makes a most attractive ornament for a car.

Dealers are selling them faster and faster as motorists' flags wear out.

If your dealer doesn't carry, we will mail to any address, postpaid, one of these handsome patriotic shields on receipt of 50 cents.

Try it on your car, and see what a fine showing it makes. Every car owner will buy one when he sees it.

Dealers, write us today. Attractive, quick seller. Small investment. No risk.

INGRAM-
RICHARDSON
MFG. CO.
Beaver Falls, Pa.

Ingram-
Richardson
Mfg. Co.
Beaver Falls, Pa.
Gentlemen:
Send me by return
post Old Glory
Patriotic Shields.
Enclosed find \$.....

Name
Address



LIKE A JACK-IN-THE-BOX

Do you feel like a Jack-in-the-Box every time your Auto hits a bump?

GABRIEL SNUBBERS

Remove the bumps from the road



Gabriel Manufacturing Co.
1415 East 40th Street, CLEVELAND, OHIO



When Writing to Advertisers, Please Mention Motor Age



Make Money Like This Man

He is a garage man and is repairing tires for his storage customers. These cars need to have the tires vulcanized very often and he makes more money from this source than he does from the storage bill or sale of supplies. You can do the very same thing with a

SHALER Vulcanizing Plant

The auto owner, when he comes to you for supplies, gasoline, oil, etc., and knows that you can repair his tires, will gladly give you the job. Give your customers this complete service they like and be ready to repair their tires.

You can easily add \$20 to \$30 more to your daily revenue without adding to your pay roll.

Anybody who can clean or adjust a car can operate a Shaler, because of the simplicity of Automatic Heat Control and

The Shaler Wrapped Tread Method

The Shaler System has been used successfully by tire makers for many years.

Automatic Temperature Control

This is an exclusive feature that keeps the temperature of vulcanizer exactly at the right point from morning till night without any watching or regulating.

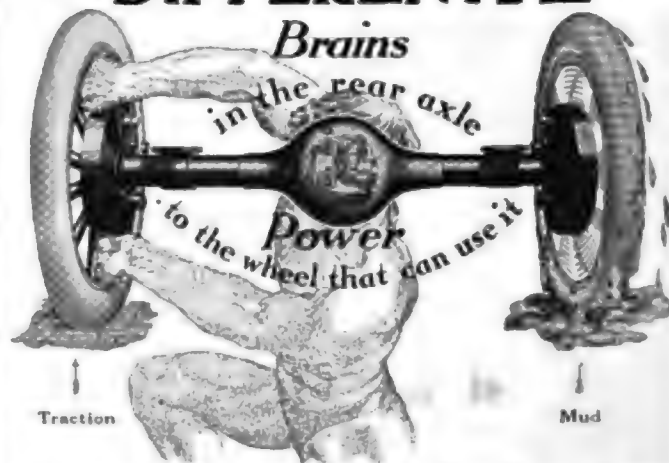
New Complete Catalog Free

Write us today for full particulars about the money-making possibilities with Shaler Vulcanizing Plant—the low price and liberal discount. We will also send you our new catalog of the complete line of Shaler Vulcanizers—and our book for dealers, "Common Sense About Tire Repairs."

C. A. Shaler Co., 225 Fourth Street, Waupun, Wis.

The largest Manufacturers of Vulcanizers in the World

BAILEY NON-STALL DIFFERENTIAL



A Fundamental Necessity For Every Car

The Bailey Non-Stall Differential *corrects a basic weakness.*

Old style differentials let the power go to waste by sending it to the wheel that does not have traction.

This causes practically all skidding, slipping, stalling, spinning and side-swaying. It is an enormous unnecessary waste of power and tires, and often causes accident troubles and expense.

The Bailey avoids all of this.

With the Bailey no power goes to waste, but *all of it is used properly.* It makes you master of all road conditions.

Anybody can install it quickly. It can be fitted to any rear axle.

Owners and dealers should write us for complete information

Bailey Non-Stall Differential Corporation, Chicago, Illinois, 1124 Michigan, Ave.

FREE TOURING MAPS



CHECK MAPS DESIRED
AND MAIL TO

GULF REFINING COMPANY

DEPT. 1875

PITTSBURGH, PA.

☐ Middle West
☐ Transcontinental
☐ New England
☐ New Jersey

☐ Pittsburgh-Buffalo
☐ Southern States
☐ Pennsylvania
☐ Texas

NAME

CITY STATE

This Is the Plug

The manufacturers listed below equip all their cars with

AC

The Standard Spark Plug of America

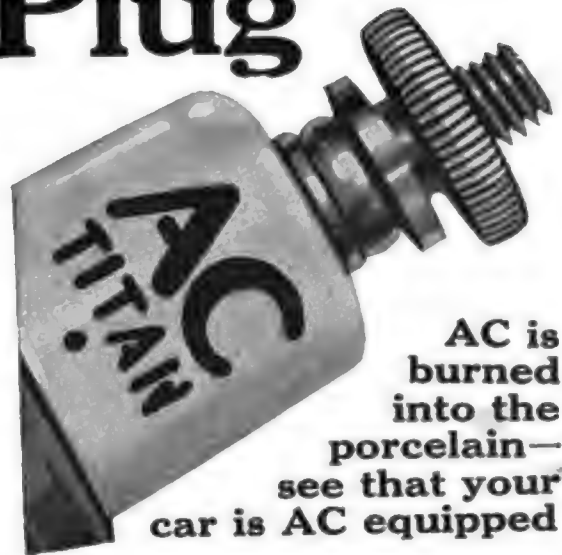


Have You
This Plug
On Your Car?

Packard
Pierce-Arrow
Cadillac
Marmon
Hudson
Chalmers
Hupmobile
Chandler
Chevrolet
Gray-Dort
Dort
Cole
Reo
Paige
Peerless
Dodge Bros.
Stearns-Knight
Saxon
Haynes

Buick
Oakland
Davis
Detroit
Paterson
McFarlan
Westcott
Lexington-Howard
Monroe
Daniels
Locomobile
Murray
Bour-Davis
Premier
Knox
McLaughlin
(Canada)

National
Valle
Jeffery
Oldsmobile
Jackson
Apperson
Fosteria
Pilot
Crane-Simplex
Singer
Stephens
Jordan
Liberty
Scripps-Booth
Pathfinder
Abbot
Anderson
Stutz



AC is
burned
into the
porcelain—
see that your
car is AC equipped

Federal
F.W.D
Diamond T
Menominee
Acme
Brockway
G. M. C.
Gabriel

Elker
Maxim
M. H. C.
Republic
Sterling
Wisconsin
Stewart
Moreland

Gramm-Bernstein
Henderson Bros.
Wilcox Trux
Netco
Old Reliable
Sandow
Signal
American-LaFrance

CHAMPION IGNITION COMPANY, FLINT, MICHIGAN

Your Home Merchants will buy *Henney* Commercial Bodies for Ford Cars

The general merchant, dry goods merchant, grocer, hardware dealer, plumber, florist, farmer and dairyman will appreciate Henney Commercial Bodies.

To Show Them Is to Sell Them

because they mean up-to-date delivery service at small cost. Direct from factory cash selling gives dealers competition-beating prices. Our catalog, free on request, shows full line of Henney Bodies, also Commercial Fenders, for which there is a big demand. Address Main Office or nearest branch.

HENNEY BUGGY

Branch of
Moline Plow Co.
MOLINE, ILL.
Factory:
Freeport, Ill.

Our Many
Branches Insure
Prompt Service
at Low
Freight
Rates

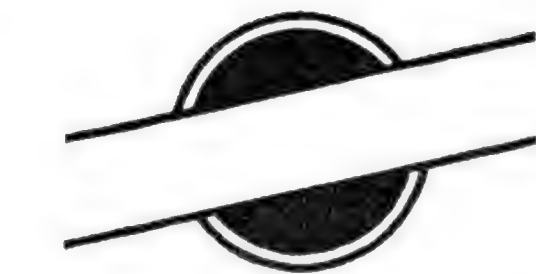


Bigger Profits

For
Automobile
Dealers

See announcement next week

For advance information wire or write MOTOR AGE, 95 West Fort St., Detroit, Michigan. Inquiries marked "Confidential" will be answered direct by MOTOR AGE and so treated.



A Policy of
**giving the
 dealer his due
 -passing pros-
 perity around—
 makes a dealer's
 contract with this
 concern a cher-
 ished acquisition
 —generally at a
 premium.**

For advance information
 wire or write MOTOR AGE,
 95 West Fort St., Detroit

See announcement
 next week

DEPENDABILITY



**20% Less Gas
 30% More Power
 Less Vibration
 No Carbon Deposit**

Dependability is all that can be asked of any piston. Aluminite Pistons are thoroughly dependable.

Made of aluminum alloy of sufficient strength to withstand the tests of hard service, high compression, high speed, and unusual strain. An Aluminite Piston is less than one-half as heavy as an iron piston of similar size and naturally the strain on the piston pin, connecting rod and crank shaft bearings is lessened in proportion. Less motor vibration, less wear on bearings, longer life to your car and more pleasure in driving, result.

Aluminite Pistons, if they take carbon at all, simply allow it to rest on the surface instead of baking it.

Your repair man will install them for you. Send us the name, model and year of your car for cost quotations.



**The Green
 Engineering Co.**
 St. Clair Street
 DAYTON, OHIO

DEALERS

Aluminite installations insure satisfied customers and increased business for you. Liberal discounts. Write or wire.

"RENEWS THE TOP"



PIMBLEY'S AUTO TOP NEWER

From OLD to NEW

PIMBLEY'S AUTO-TOP-NEWER

is supreme for restoring tops of leather, buckram or mohair to their original beauty. A buckram lined with a brush. Use it on cushions and trim. Dress in a clean, smart suit. Fine for under parts of car, too. At garage, drug, hardware or auto supply store or write us at St. Joseph, Mo.

PIMBLEY'S AUTO-NEWER

"Cleans and new any exterior finish."

Vastly superior to any other wax, paste or "polishes." Removes the finish, streaks, stains, leaves the FIRST finish and keeps it new looking. Absolutely different. No. 1, \$1.00.

PIMBLEY PAINT & GLASS CO.
 ST. JOSEPH, MISSOURI



Selden Trucks

"100% Efficient"

That's the way one Selden user puts it. He says: "We have, under an extraordinarily heavy business, given our Selden Truck a severe test; and in every instance, under all conditions of weather and load, it has proved itself 100% efficient. The truck has given us no trouble and is always ready to start." Selden Trucks are constructed to master the most severe task to which a motor truck can be put.

DEALERS: Write for territory

Selden Truck Sales Co.
 Rochester, N. Y., U. S. A.

The Most Powerful
SEARCHLIGHT

The Most Convenient
TROUBLE LAMP

SILVERBEAM SEARCHLIGHT

Reg.
U. S.

Pat.
Off.

*A Searchlight and Portable
Trouble Light Combined*

Wherever you go with your car and need a light, for driving, in camp, for fishing, for repairs, SILVERBEAM Searchlight is always ready for use. Besides being a most efficient searchlight—surpassed by none—it is also a trouble lamp you can carry to any part of the car, camp or roadside when you need a light.

Attaches to either side of car, on windshield or door. Black and nickel, black or nickel. Gray, red, blue, etc., on order. When ordering state make, model and battery voltage of your car.



Price
\$9.00 complete

with all connections, all nickel or all black

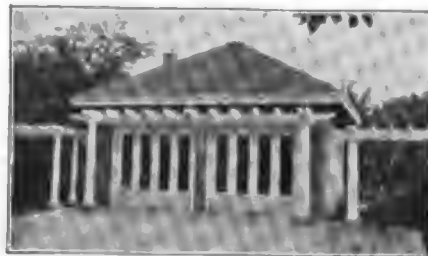
Dealers, write for details

Williams Mfg. Co.
310 N. Flower St.
Santa Ana, Calif.

Slidetite

Garage Door Hardware

(R-W No. 433 Patented)



**A Thing of Beauty
and a Joy Forever**

Lends architectural attractiveness to the garage.
Doors cannot sag nor slam.
Slide inside out of the way.
Operate in small space.
Close tight into door frame.

Sold by the best hardware trade everywhere

Write for booklet, "Distinctive Garage
Door Equipment." Sent without obligation

Richards-Wilcox Manufacturing Co

NEW YORK
NEW JERSEY
NEW YORK
NEW YORK
NEW YORK

AURORA, ILLINOIS, U.S.A.

Richards-Wilcox Canadian Co., Ltd., London, Ont.
"A hanger for any door that slides"

PHILADELPHIA
PHILADELPHIA
PHILADELPHIA
PHILADELPHIA
PHILADELPHIA

Schrader

Tires that are kept inflated to the pressure recommended by tire makers last twice as long as tires that are used with the air in them unmeasured.

**USE a SCHRADER
UNIVERSAL TIRE PRESSURE
GAUGE**

and double the life of your tires.

Price in U. S. A. one dollar

At your dealer or

A. SCHRADER'S SON, Inc.

781-801 Atlantic Ave.

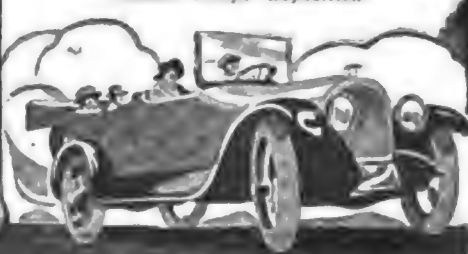
London

Chicago

Brooklyn

Toronto

Highest award at the
Panama Pacific Exposition



Get

**75 To 80 Miles An Hour From Your Ford
With These Peugeot Type Cylinder Heads**

Your Ford will ramble faster than you can drive it on the road—and it will step way ahead of ordinary Fords on the race course, equipped with ROOF'S Peugeot-Type Cylinder Heads, and 3 to 1 gear ratio.

16 Overhead Valves

—almost double its valve area, and there is absolutely no back pressure in the exhaust outlet.

Easy to install. Set right in the place of the old cylinder head. Special intake manifold included without extra cost. Rocker arms operate from the regular cam shaft. Get our liberal C. O. D. offer. Write for free literature and complete details.

A big year-'round seller. Rush season now on.

Dealers, garage and repairmen, write.

ROBERT M. ROOF, Mfg.

610 MERIDIAN STREET, ANDERSON, INDIANA

Service

"SERVICE" means different things in different hotels—determined in each case by the class of patronage. The Hollenden is patronized by people of discrimination, of taste and of culture—who recognize the best and who demand it. Hollenden service is tuned accordingly. This means cleanliness, carefulness and correctness, from kitchen to table; quiet elegance in furnishings and appointments throughout; real comfort in parlors and rooms, and intelligent, prompt attention to all requests. Hollenden "service" means everything just as you would have it.

*The Hollenden
Cleveland*

European Plan with Bath

For One Person
\$2 to \$5

For Two Persons
\$3 to \$6

With Twin Beds
\$4 to \$6

Suites
at various prices



Built-In Wear



Woodworth Tires wear well. Guaranteed for 5,000 miles, they nearly always exceed that distance. And they do it without puncture or blowout.

They are not only well made but protected tires.

WOODWORTH Trouble-Proof TIRES

Dealers: Do you understand our proposition? Do you know what we will do for you? Are you there with the facts about Woodworths? If not, write TODAY! There's money in it—and big business.

Woodworth Mfg. Corp.
Niagara Falls New York

"WHITNEY" TRANSMISSION CHAINS



Silent Type

For driving Camshafts, Magnetos,
Lighting Systems, Generators,
Pumps, Self-Starters, etc.

If you contemplate the use of Silent Chain, don't fail to try the "Whitney"

The Whitney Mfg. Co., Hartford, Conn.

CHAINS

KEYS

HAND MILLING MACHINES

Has Your Engine
the same comparative
power at all
speeds, or is it
handicapped by the ignition.



HIGHTENSION SIMMS MAGNETOS

produce their most intense spark at low speeds in the retard and at high speeds in the advance —this means maximum efficiency and flexibility.

It's in the patented pole shoes.

Write for literature

THE SIMMS MAGNETO CO.

272 N. Arlington Ave.
East Orange, N. J.



A GOOD TIRE PUMP THE VICTOR

Triple
Action

Brass
Tubes



Price
\$5

Insures Tire Service
and Peace of Mind

JUDD & LELAND MFG. CO.
CLIFTON SPRINGS NEW YORK

There is a
considerable
amount of
pride to be taken in repre-
senting a motor car which
is internationally re-
nowned—seen and respect-
ed in every civilized
country on the globe.

See announcement next week



For advance information wire or write MOTOR AGE, 95 West Fort St., Detroit, Michigan. Inquiries marked "Confidential" will be answered direct by MOTOR AGE and so treated.



Commerce
TRUCKS
1 TON CAP

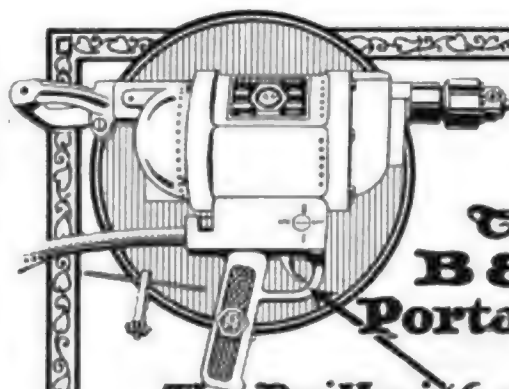
**A Year Ahead
of Other Trucks**

The only truck having everything
necessary on it—when you buy it

Three types of bodies for all models—Remy Start-
ing and Lighting—Stewart Vacuum System—Pierce
Governor—Windshield—Bumper.
Continental Motor—Torbenzen Rear Axle—Detroit
Steel Products Company Springs. Price—\$1350
f.o.b. Detroit.

The Commerce Motor Car Company
DETROIT MICHIGAN

W. H. Brinkerhoff, Eastern Dist. Mgr.
Belmont Ave., Elmhurst, Long Island, N. Y.



**The
B & D
Portable**

**The Drill with the
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Don't break any more bits by reaching for the
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Portable and have the switch on the drill, where
a pull of the trigger turns off the current.

You can hold it steadier, drill faster, and with more
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Takes the Place of Expensive Shock Absorbers

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Electric Auto-Lite
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Electric Auto-Lite equipment for automobiles is as famous for the service that backs it as for the reliability and economy of its operation.

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THE STORM & O'HAIR
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is adjustable and will rebore practically all makes of

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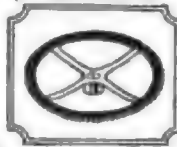
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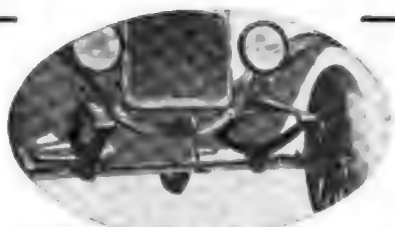
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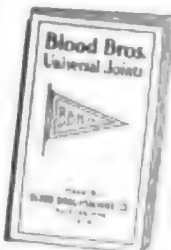
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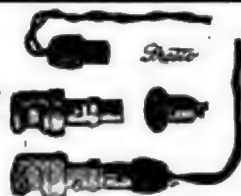
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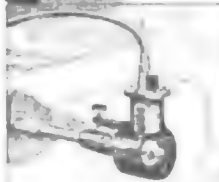
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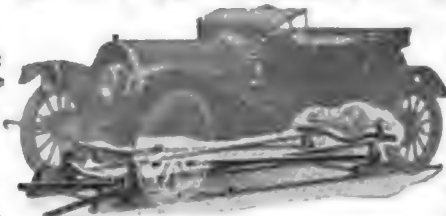


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Reduces
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Write for literature. Features the greatest money,
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They follow closely the lines of the preceding series, and the only changes are in the nature of refinements.

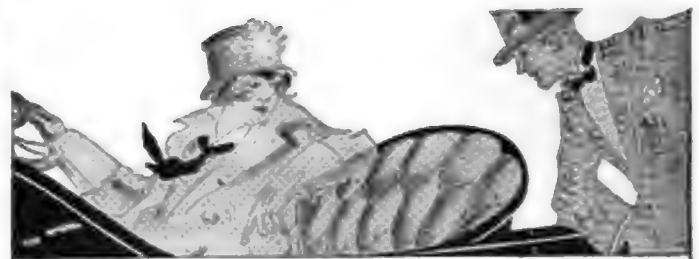
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1 1/4 ton Chassis 2 1/4 ton Chassis

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Every Bricton Tire is sold under a specific 10,000 mile written service guarantee. This guarantee is the longest and strongest ever put behind a pneumatic tire and is a positive protection to every purchaser. Bricton Tires are Puncture-Proof, and proof against blowouts, skidding, cuts, rim-cuts, oil and gasoline. Wonderful testimony, easy rolling qualities and economy commend these to every car owner.

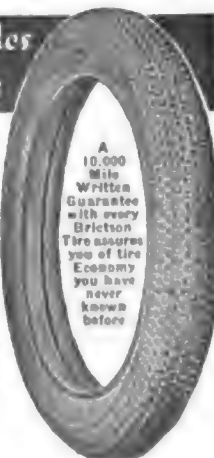
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Tire assures
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Economy
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1 1/2 Ton Capacity


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For FORD CARS

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He knows the only shock absorber for Fords that does more than you expect.

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Easiest — Safest — Quickest Method

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DO IT RIGHT Essential to every repairman. Cut a clean, even hole in any style clutch and brake lining. 5/16 in. shank can be used—wether hand drill or power press.

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ordinarily don't go hand in hand. But with a



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you get easy starting without batteries, regardless of the compression or grade of fuel used.


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A complete socket wrench set in itself. Adjusts automatically. Can be used with both hands, like a bit and brace. Holds like a vise. Cannot slip off. Carries in the tool box when not in use.

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FIRESTONE quality insures Most Miles per Dollar, comfort, safety and elegance.

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Branches and Dealers Everywhere

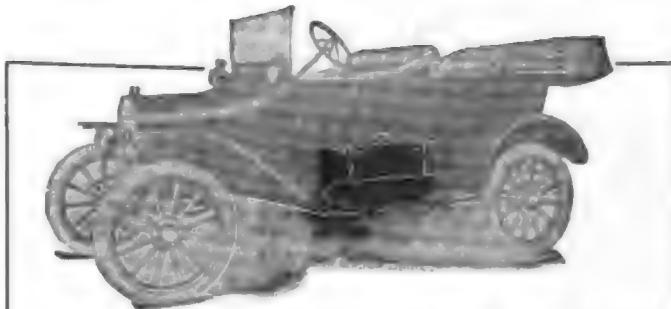
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THE 100% PERFECT SPOTLIGHT



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Complete with all accessories and 100% perfect. Other models available at \$15.00, \$20.00, \$25.00, \$30.00, \$35.00, \$40.00, \$45.00, \$50.00, \$55.00, \$60.00, \$65.00, \$70.00, \$75.00, \$80.00, \$85.00, \$90.00, \$95.00, \$100.00.

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SPARK
PLUGS**

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"Molite"
50c

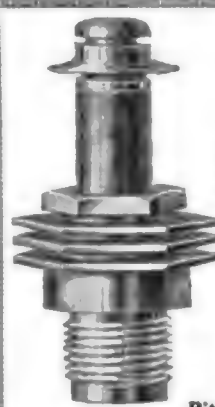
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For The Life of
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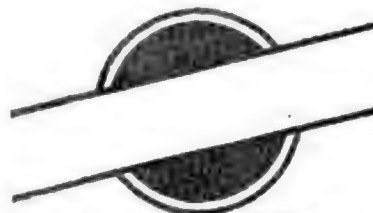
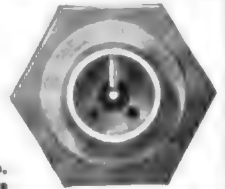
Specially designed for aviation use, this plug is as near perfection in design and construction as we can make it.

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Pittsfield Timers
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reputation for com-
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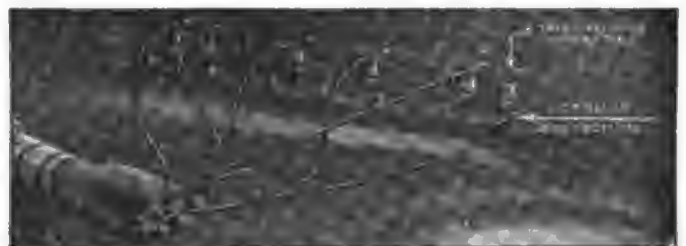
The Pittsfield Dis-
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First Aid for All Motor Troubles

Such as faulty ignition, missing explosions from any cause, weak cylinders, leaking valves or pistons, faulty valves or ignition timing, bad carburetor adjustments, knocking in cylinders or bearings, carbon troubles, etc. Made in two models for any number of cylinders.

Write for literature or order today.

PRICES \$2.00 to \$9.50

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BOSCH

Magneto included in the specifications is evidence of the superiority and reliability of that car.

Be Satisfied Specify Bosch

Bosch Magneto Co.
214 W. 46th St., New York

Make More Profits

With a Universal Cylinder Reboring Tool

The extra profits from cylinder reboring, on overhauling work alone, make a UNIVERSAL Cylinder Reboring Tool a paying investment from the start. Adjustable for any cylinder.

Write for Catalogue A

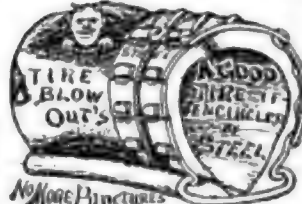
THE UNIVERSAL TOOL CO.
DETROIT, MICHIGAN



Steel Tires and Mud Chains



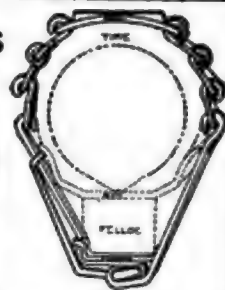
Old Tire
Covered
Complete



No More Punctures

Try 2 or 3 sections over any old blowout. Can't have blowouts, punctures; neither can the rubber wear off.

Special prices to those in new territory



Anti-Skid

Mud chains can be put on in a jiffy with one hand while standing on the running board. Hook the ends together and push the little lever. If you get in a mud hole you will laugh out loud.

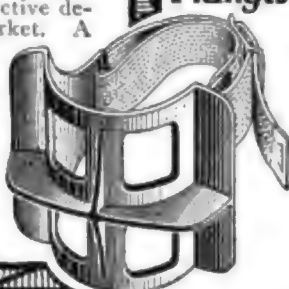
Kimball Tire Case Co., 173 Broadway, Council Bluffs, Ia.

Fulton Mud Hooks

\$1.90 per set of two. Lift the car out instead of digging it in deeper. Thousands in use. Most effective device of its kind on the market. A time and money saver. Act with steady lift which does not strip the differential gears. Made of malleable iron with strong web strap. Put on or take off in a minute. Occupy small space.

At your dealers or by mail, postpaid. Give size of rear tire in ordering.

THE FULTON CO.
746-742 National Ave., Milwaukee



Note
The
Side
Flanges

DETROIT BATTERIES

Last approximately six months longer than the average battery. They are about 15 percent more powerful in proportion to size and cost.

This is why their sale is now increasing on an average of over 60% every four weeks—a record no other battery has ever approached.

Detroit Battery Co., Detroit, Mich.
Eastern Branch: 6th and Broadway, New York City

When Was
Your Battery
Tested?



It needs occasional attention or it will fail to work when you most need it.

USL Service Stations test all kinds of batteries free

Take yours periodically and let them keep it up to its full strength.

U S Light & Heat Corporation, Niagara Falls, N.Y.

In Stock—for Every Car



Write FOR CATALOG
AND DISCOUNTS
**DISPLAY RACK FREE
WITH ORDER FOR
12 ASSORTED**

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SPRINGS YOU ARE SURE OF

No uncertainty
as to service or wear of
HIGGINS QUALITY SPRINGS
FOR REPLACEMENT

No center breakage—new rib construction prevents it. Absolute security from tip to tip—combined with utmost riding comfort. Squawk and rust-proof. Painted black. Ready for installation. For all cars. Quick service. Big discounts to dealers. Write for catalog C-1917 and prices.

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NO BOLT—NO HOLE—NO HUMP

BURD High Compression PISTON RINGS

"The Accepted Standard"

BURD HIGH COMPRESSION RING CO.
ROCKFORD, ILLINOIS

Sales Offices in All Principal Cities.

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AUTOMATIC IGNITION CONNECTICUT




Identification!

This Mark identifies Connecticut Automatic Ignition. It appears on the ignition control button of the Connecticut Switch.

"The Device of Efficiency"

CONNECTICUT TELEPHONE & ELECTRIC COMPANY
Meriden Conn.

Price Only \$4




Does \$25 Worth of Work

Make your own auto trunk at small cost with Presto Clamp

An ordinary soap box, two suit cases and an oilcloth cover, locked to your running board with a \$4 PRESTO Clamp, will serve you as well as a \$25 auto trunk—or better. PRESTO Clamp securely fastens any trunk or box to the running board, and locks it there. Strongest, quickest, most efficient luggage fastening and locking device. No holes to bore. Ask your dealer or if your dealer can't supply you, send us \$4 for set of 2. DEALERS get attractive prices.

Jobbers write
LUDWIG L. BLAKE
South Bend Indiana



Your Silent Partner

Attracts and Holds Business for You



The Curtis Air Compressor is one of the biggest assets you can add to your business. Attracts trade your way even when you are absent. A poor system becomes a liability—drives customers somewhere else—takes up your time with repairs—and costs a lot of money to keep in condition. The Curtis Compressor furnishing

CURTIS AIR Free From Oil

is built right—by a manufacturer of over 25 years' experience and its design assures a never failing supply of good, clean air. This means minimum tire trouble for your customers, which draws trade your way. Made in 5 sizes and 125 combinations. Write for full particulars. Or ask your jobber for prices, but insist on the CURTIS.

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Branch Office, 2208 Hudson Terminal, New York

DISCO

New Two-Unit Starting and Lighting System for Ford Cars

Best for the Ford owner because it is the most powerful, reliable, and long-lived Ford system ever produced.

Best for the dealer because it satisfies and keeps customers and because of its wonderful simplicity. Installing time less than three hours. Removing four through bolts permits inspection and adjustments. Price \$85.00 installed.

Disco Electric Lighting & Starting Corp.
DETROIT

Eastern Branch: 65th and Broadway, New York City

Genemotor


(Trade Mark)

"It starts your Ford and lights it too"

Weights forty pounds. Powerful, compact, sure. Can be installed in five hours or less. Each one warranted. "USL" Battery Standard Equipment.

Built by the General Electric Co.
Price \$85 f. o. b. Lynn, Mass.
Sold Everywhere

A. J. PICARD & CO.
General Distributors, Broadway at 61st St., N. Y.



On the *price* of the cars you handle depends the *amount* of business you do. See announcement next week.

For advance information wire or write
MOTOR AGE, 95
West Fort St., Detroit.

Miller Carburetors

Sons of France Win with Miller

Another triumph registered at Cincinnati for Miller Carburetors when Louis Chevrolet won 1st place, Gaston Chevrolet 2nd, Tom Milton 4th, Eddie Hearne 5th, Earl Cooper 6th.

All Miller Equipped

The World's Champion Carburetor is the Miller—proven best in actual performance. Equip your car with the Miller for greatest satisfaction. Literature on request.

Manufactured and Distributed by
HARRY A. MILLER MFG. CO.
General Office and Factory
217 East Washington Street
Los Angeles, Cal.



PROVEN BEST IN EVERY TEST

Waukesha

TRADE-MARK REG.

TRUCK MOTORS

"The Exceptional Motor"

combine battleship strength with aeroplane lightness. The design, the materials, the construction all make for greater efficiency. Catalog M gives full details. Write for it.

WAUKESHA MOTOR CO.
221 Factory Bldg.
Waukesha, Wisconsin



When Writing to Advertisers, Please Mention Motor Age

"The Most Advanced Truck in America"

Its magnetic transmission effects a great saving in wear and tear on the motor, chassis and tires—and substantial economy in operating costs.

Two Ton Truck....\$3300
3½ Ton Truck.....\$4000

Bourne Magnetic Truck Company
Sedgley Avenue, at North 17th Street
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SEAT COVERS



Made of

**Laidlaw's Burbank,
Limitex and Onyxcloth**

**Best Quality
Bottom Prices**

We have on hand all late seat cover models, including 1917 Cadillacs, Hudsons, Chandlers, Chalmers, Buicks, Overlands, etc.

Attractive prices for Dealers. Samples on Request.

PHILLIPS AUTO SEAT COVER CO. 244 W. 49th St. New York City

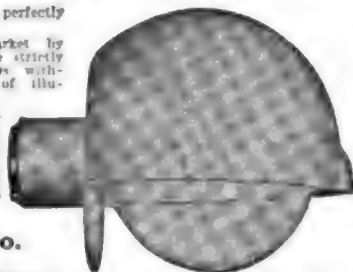
AMES DEFLECTOR

80% More Light Below the Horizontal—No Glare—Perfect for Driving in Fog or Mist

A scientifically designed and perfectly constructed optical device.

The only means on the market by which a headlight can be made strictly to comply with non-glare laws without greatly reducing amount of illumination.

We guarantee that with the Ames Deflector a parabolic headlight reflector will project 80% more light below the level of headlight axis, and over 45% more than any known so-called non-glare headlight device on the market.



Heinze Electric Co.

Lowell, Mass.

Detroit Chicago

Tomahawk Spring Lubricator



Inject Graphite between the leaves of the springs and get 100% easier riding from your car, without squeaks and danger of breaking springs. The Graphite works into the pores of the steel and makes a polished bearing between each spring leaf. It lubricates indefinitely. The Tomahawk can be inserted with the pressure of the fingers or a light tap of a hammer, if the car is jacked up.

PRICE \$1.25 EACH

Tomahawk Graphite Spring Lubricant sufficient for 3,000 miles, 17.00 per tube, \$0.30; also packed in display boxes, one dozen each.

CHARLES W. MANZEL CO., 311 Beard Avenue Buffalo, N. Y.



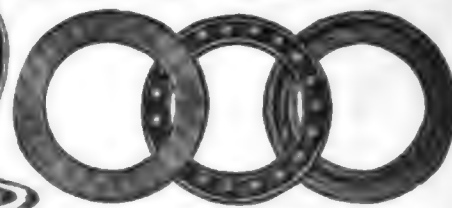
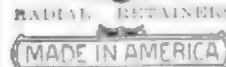
MANLY TRUCKS—The Biggest Advance in Truck Construction of the Decade, 1½ and 2½-ton Models

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MANLY MOTOR CORPORATION
WAUKEGAN, ILL.

The Bearings Company of America

LANCASTER, PA.

Western Office, 604 Ford Bldg., Detroit, Mich.



COMPLETE THRUST BEARING

Manufacturers of Star Radial Ball Retainers, Star Ball Thrust Retainers, Star Complete Ball Thrust Bearings

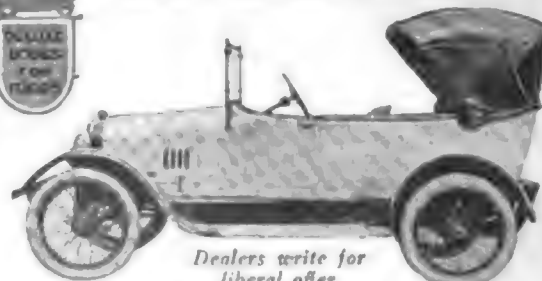
Celfor

Internal Gear Drive Axle

There are varying arguments in favor of all types of axles. The reason why the internal gear drive principle is quickly and simply explained in our booklet "Twelve Talks to Engineers."

Order Talk No. 100 from American Electric Steel Co. which we will send you free. Write I. F. H.
CLARK EQUIPMENT COMPANY, Buchanan, Mich.
Bucknure 10

"Seen Where the Best Cars Go"



Dealers write for liberal offer

DETROIT AUTO PRODUCTS COMPANY
38 Sherman Street, Detroit, Mich.

The Ford Owner Knows He Needs It

That is why he buys so many of our

Improved Emergency Brakes

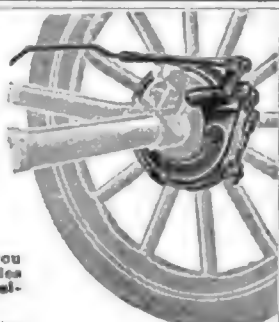
The hub drum is the right place for an emergency brake. Ford owners know this.

You have a big field of prospects and a big thing to sell.

We are behind you with our sales helps and a positive guarantee.

Don't wait. Write us today.

Jobbers get in on this.



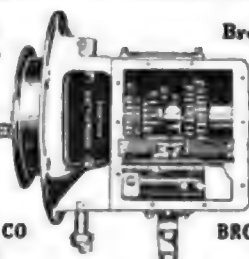
Retails at \$10 a pair
Big Discounts

L. A. LEATHERS COMPANY, Brookville, Pennsylvania

Names Synonymous with the Beginning of the Automobile Industry

Brown-Lipe
Transmissions

Brown-Lipe-Chapin
Differentials



BROWN-LIPE-GEAR CO
TRANSMISSIONS

BROWN-LIPE-CHAPIN CO.
DIFFERENTIALS

Factories and General Offices
Syracuse, N. Y.

WINTON SIX

Exceptional men and women find just what they value highly in the Winton Six. Designed to the personal taste of its individual owner, every Winton Six is exclusive; yours is distinctly your own, and it is recognized at sight as superior, out-of-the-ordinary, and good to behold. Let us talk it over with you.

Write today for catalog

THE WINTON COMPANY
424 Beros Road, Cleveland, Ohio

Miles Cheaper

Settle the
MILEAGE
PROBLEM—
Use



Users Report
Records of
8,000
10,000
12,000
15,000
Miles

Quaker City
Rubber Co.
Philadelphia

For advance information
wire or write MOTOR AGE,
95 West Fort St., Detroit



If you believe all you need is the *chance* to become a big-caliber dealer or distributor, see announcement next week

N-E-C-O

Tom Thumb CARBURETER

Modernly Designed for Present
Day Low-Grade Gasoline

TOM THUMB, Jr. for FORDS—\$15

Send for Illustrated Folder

The National Equipment Co. 129 S. Racine Avenue
CHICAGO

"I didn't know such riding comfort and such driving ease were possible," said a Liberty buyer. The

LIBERTY

is built to satisfy you, with a score of exclusive features for your satisfaction. Let them prove themselves to you—today. \$1195.

Liberty Motor Car Co.
Detroit



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"Confidential" will be answered direct by MOTOR AGE and so treated.

Does the work of 3 horses and more — at less than one-horse cost.

Attached to any Ford car. The only really convertible tractor unit. Can be converted in 15 minutes from automobile to tractor, and in 15 minutes back to pleasure car again. We Can Make and Deliver Unit Tractors as Fast as You Can Sell Them.

We can furnish you with a demonstrating outfit at once. It will be shipped on receipt of your order.



\$175

F. O. B. Chicago

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UNITRACTOR FOR FORDS

Live Dealers and Distributors Wanted. Write.

THE UNITRACTOR COMPANY 376 N. CIGERO AVE., CHICAGO

DUTCH BRAND



Products comprise 27 motoring necessities, among which are 2-In-1, Tread Filler, Auto Puncture Cement, Vulcanizing Cement, Radiator-Seal, Rubber-Seal, Carbocide Carbon Remover, Varni-Brite Auto Polish, Tire Talc, Tire Tape, etc.

Order from your dealer

VAN CLEEF BROS.

Wholesale and Retail Dealers in Automobile Accessories

7701-7711 Woodlawn Ave.

CHICAGO

KINGSTON CARBURETOR

Save Money by Economizing Gasoline

Four floating bronze ball valves opening automatically under different motor demands supply a uniform mixture at any speed, regardless of hot, cold wet or dry weather.

Write for details and let us tell you why so many manufacturers are adopting this carburetor as standard equipment.

MADE BY THE OLDEST MANUFACTURERS OF CARBURETORS IN AMERICA

ESTABLISHED 1895

BYRNE, KINGSTON & COMPANY, Kokomo, Indiana

THE TURNER LEAD BURNING OUTFIT

The Turner No. 7 Outfit enables you to burn storage battery connections, weld and brass metals quickly, efficiently and economically. It operates with oxygen combined with either illuminating gas, acetylene or hydrogen; also with air pressure combined with either illuminating gas, acetylene or hydrogen. It will produce a very small needle flame or a flame sufficiently large for welding and brazing.



No. 17 Torch, furnished with No. 1 Lead Burning Outfit

THE NO. 7 IS NEW AND ORIGINAL

WRITE FOR LITERATURE

THE TURNER BRASS WORKS

SYCAMORE, ILL. U. S. A.

MARION-HANDLEY

THE SIX PRE-EMINENT

Character and power, expressed in every line of body and detail of mechanism are business-getting selling points that pay. They give the advantage from the start to dealers of MARION-HANDLEY, The Six Pre-Eminent.

Model A 6-40, \$1350 f. o. b. Jackson Model B 6-60, \$1650

Every progressive dealer should know our selling plan. Write.

THE MUTUAL MOTORS COMPANY

J. I. HANDLEY, President

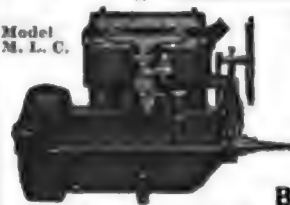
Jackson, Michigan

Passenger and Commercial Car Motors

Beaver Motors
Fit Every Demand

There are BEAVER Motors in a variety of sizes, suitable for all pleasure car and commercial car requirements. Meet all demands for power, economy and dependability.

Model N. L. C.



Over-head valves. 20% to 25% more power than other motors of same bore and stroke.

Write today for BEAVER specifications before deciding on the motor to use

BEAVER MFG. COMPANY

1st & Oklahoma Ave., Milwaukee, Wis.

4-Cylinder—4-Cycle

KINGSTON CARBURETOR

Save Money by Economizing Gasoline

Four floating bronze ball valves opening automatically under different motor demands supply a uniform mixture at any speed, regardless of hot, cold wet or dry weather.

Write for details and let us tell you why so many manufacturers are adopting this carburetor as standard equipment.

MADE BY THE OLDEST MANUFACTURERS OF CARBURETORS IN AMERICA

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BYRNE, KINGSTON & COMPANY, Kokomo, Indiana

\$1

BERGIE National SPARK PLUGS

The BIG POWER Plug with the ONE INCH Firing Surface

Bergie National Spark Plug Company, Rockford, Ill.

DETROITER SIX-45

The Six of Advanced Construction

UNIQUE
VALUE
\$1250
RAPID
SELLER

Detroit Motor Car Co., Detroit, Mich.

For advance information
wire or write MOTOR AGE,
95 West Fort St., Detroit



Dealers in the
South and South-
East see announce-
ment next week.

The Hundred Point Six

The car of a Hundred Quality Features—Kissel—
built from the ground up—distinctively individual
in appearance and performance. Inspect it today.
DEALERS—Unusual opportunities in un-
allotted territory. Write or wire us today.

KISSEL MOTOR CAR CO.
HARTFORD, WIS.

KISSEL

KAR
EVERY INCH A CAR

“Put the Colors Permanently at the Front”

Metal Flag or Shield

(5 1/4 x 3 1/2)
HIGHLY ENAMELED
Supplied with studs or wire
attachment.

Price \$2.00 Each

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ALLEN PIN COMPANY 181 Sabin Street Providence, R. I.

Gordon Easy-On Seat Covers

Add style, class and distinction to any car. They are a mark of refinement and good taste.

They give better service, more comfort, pleasure and satisfaction in riding than bare leather.

They protect clothes from soil and stain; save cleaner's bills; retain the new look of cushions which adds to the resale value of the car.

Ask your dealer about them TODAY, or, write the factory for samples of materials and prices of covers that will be "tailored to fit" your car perfectly.

THE J. P. GORDON CO.
No. 388 No. Fourth Street

COLUMBUS, OHIO

The Only Truck Attachment that Includes Unit, Cab and Body in one Job at one Price

Graham
Brothers

All-3

TRUCK ATTACHMENT

\$385

Choice of
either Stake
or Express Body

Express Body

Saves you \$75 to \$125 on body equipment. Write for booklet. Get our dealers' proposition.

GRAHAM BROTHERS, Dept. D, Evansville, Ind.

The "Big Stick" That Brings Down Gasoline Expense

Up goes the price of gasoline! Maximum mileage is the big problem of the day! Solve it with the new Stromberg Carburetor.

The Official world's record made by the New Stromberg in gasoline mileage prove that you need the New Stromberg on your car. Mail coupon for details of how the New Stromberg will reduce your gasoline bills.

Stromberg Motor Devices Co., Dept. 27, 84 East 25th St., Chicago

New STROMBERG Does it!

CARBURETOR

HERCULES SPARK PLUGS

GUARANTEED
FIVE YEARS

ECLIPSE MFG. CO.
INDIANAPOLIS U.S.A.

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THE CLEARING HOUSE

of the Motor Car Industry

For Used Cars, Parts, Accessories, Supplies, Tires, Repairing, Machinery and all other Special Announcements of a Similar Character

ADVERTISING RATES ON REQUEST

Watch this column for great Auto Part Bargains

CARBURETORS

Schebler, Model O, 1 1/4", \$8.20; Model L, 1 1/4", \$10.00; Model R, 1", \$10.00; Stromberg, Type K, 1", \$8.20; Bennett, 1 1/4", \$3.95; Kingston and Holly, top intake, 1 1/4", \$4.50; for Fords, \$5.40.

WINDSHIELDS

Many types and sizes, price from \$8.00 up. Rain vision ventilating windshields for trucks, complete with rods, \$13.50; rain vision ventilating windshields for Ford commercial bodies, will also fit models previous to 1914, \$10.00. Write for special circular.

FENDERS

Hayes crown fenders for Fords, per set of four, \$13.00; Long slope speedster fenders for Fords, complete with running boards and dust shields, \$7.00; Rear fenders for Ford commercial bodies, flat top, \$3.00; Front fenders for Dodge cars, \$3.00; Many others that will fit most any make of car, \$3.00.

AXLES

Full floating rear axle, complete with hub for wire wheels and drive shaft, \$75.00; Axles for Kirt cars, complete, front, \$15.00; rear, \$40.00; Rear axle and transmission units for Studebaker 25, Maxwell 1914, E. M. F. 30, Everitt 30, \$55.00; Left hand drive front axle, complete with hub for wire wheels, \$25.00. Many others, front and rear, price from \$15.00 up.

SHOCK ABSORBERS

Hartford, with fitting, per set of four, for any make of car, \$25.00; Monnex, regular price, with fitting, \$50.00—our price, \$30.00.

DELCO

Starting, lighting and ignition units, designed for Oakland Model 36 1914, Patterson Model 32 and 33 1914, Buick Model B, 24, 36, 37 1914; Keeton Model 43 1914, Olds Model 42 1914, Cartecar Models 7 and 9 1914 and 1915. Can be fitted to many others; our price, \$40.00.

SPRINGS

Rear springs for Fords, \$3.50.

RIMS

Baker 36x4 1/2, \$3.50; 36x4 and 34x4, \$2.60; 32x3 1/2, \$3.00; Booth 26x4 1/2 Universal, \$4.50; 34x4 1/2 Universal, \$4.50; 36x4 Universal, \$2.50; 32x4 Clincher, \$2.50; Stanwell, 36x4 1/2 Universal, \$4.50; 36x4 Universal, \$3.50; 32x3 1/2 S. side, \$3.00; Detroit 32x3 1/2 S. side, \$3.00; 32x3 1/2 Clincher, \$3.00; 36x4 S. side, \$2.40.

BODIES

All kinds and sizes, price from \$15.00 up. Speedster bodies for Fords, will fit any model chassis since 1910, complete with fenders, gas tank, running boards, dust shields, \$55.00.

TOPS

One-man T. C. mohair, \$31.50; rubber, \$28.00; Four-haw T. C. special, \$21.50; rubber, \$21.00; Roadster, mohair, \$21.50; rubber, \$18.00; special tops that will fit Ford touring cars, made of 32 oz. rubber, \$18.50; One-man silk mohair that will fit Briggs Detroit, King B, 1914 Port, 1914 Maxwell 25, \$25.00. All complete with curtains and dust boot.

Write for a copy of our Bargain Bulletin

Puritan Machine Company

ALL PARTS FOR ALL CARS
410 Lafayette Blvd., Detroit, Mich.

Be Quick!

We have just purchased an enormous stock of

Tires

Originally GUARANTEED for
4,000 MILES

Service and Satisfaction to

All Our Customers

A TRIAL ORDER Will Convince You

All New, Fresh, Selected Stock

Size	Tires	Tubes	Size	Tires	Tubes
28x3.....	\$ 6.75	\$1.50	35x4.....	\$15.50	\$3.45
28x3 1/2.....	7.75	2.00	36x4.....	16.00	3.50
30x3 1/2.....	9.75	2.25	34x4 1/2.....	18.25	4.00
31x3 1/2.....	10.25	2.50	35x4 1/2.....	19.00	4.00
32x3 1/2.....	10.50	2.50	36x4 1/2.....	19.00	4.00
34x3 1/2.....	12.50	2.55	37x4 1/2.....	20.00	4.00
31x4.....	13.75	2.90	35x5.....	19.50	4.00
32x4.....	14.50	3.20	36x5.....	20.50	4.00
33x4.....	14.75	3.25	37x5.....	22.00	4.00
34x4.....	15.25	3.35			

Add 10% for Non-Skid.

Send \$1 deposit with each tire ordered. Tires will be sent promptly C. O. D., with privilege of examination. Specify style of rim to avoid delay.

Special Proposition to Live Dealers

Tire Repair & Supply Co.
1429 Michigan Ave. CHICAGO

SLIGHTLY USED AND
DEMONSTRATING TIRES

—OUR—

Tires

Mean ECONOMY to Motorists

A Trial Will Convince You

Size	Tires	Tubes	Size	Tires	Tubes
30x3.....	\$ 4.00	\$1.35	35x4.....	\$ 7.25	\$1.75
30x3 1/2.....	4.75	1.45	36x4.....	7.50	1.75
31x3 1/2.....	5.00	1.50	34x4 1/2.....	7.90	1.75
32x3 1/2.....	5.25	1.50	35x4 1/2.....	7.90	1.80
34x3 1/2.....	5.50	1.60	36x4 1/2.....	8.00	1.85
31x4.....	6.25	1.65	37x4 1/2.....	9.25	1.90
32x4.....	7.00	1.60	35x5.....	8.00	2.00
33x4.....	7.25	1.70	36x5.....	9.10	2.00
34x4.....	7.75	1.70	37x5.....	9.50	2.20

—and remember, whenever you are ready to buy tires to look in these columns first for our advertisement, with the lowest prevailing prices for service.

Send \$1 deposit with each tire ordered. Tires will be sent promptly C. O. D., with privilege of examination. Specify style of rim, to avoid delay.

Aetna Tire & Supply Co.
1463 Michigan Ave., Chicago, Ill.

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Tires Sale Tubes Sale NOW ON

Do not be misled by these low prices. These Tires and Tubes are brand new and were originally guaranteed 3500 to 5000 miles, that you pay so much more for.

A RARE OPPORTUNITY
FOR A SHORT TIME ONLY

Tires		Tubes		Tires		Tubes	
30x3.....	\$ 7.00	\$1.25	32x4 1/2.....	\$13.50	\$3.75		
30x3 1/2.....	9.00	1.75	34x4 1/2.....	18.00	3.80		
32x3 1/2.....	10.00	1.60	35x4 1/2.....	18.25	2.60		
30x4.....	10.00	2.50	36x4 1/2.....	19.25	3.00		
32x4.....	13.25	2.80	37x4 1/2.....	19.65	4.00		
33x4.....	13.65	1.90	35x5.....	19.00	4.50		
34x4.....	14.25	1.20	36x5.....	20.00	4.70		
35x4.....	15.15	3.30	37x5.....	21.50	3.40		
36x4.....	15.50	3.50	38x5 1/2.....	25.00	4.50		

10% more for Non-Skid.

One dollar deposit, or sufficient to cover express cost, required with each mail order. Shipments made promptly, subject to your inspection.

—CORRESPONDENCE SOLICITED—

AUTO NEEDS COMPANY
1602 S. Michigan Ave. Chicago, Ill.

Thousands of Miles Extra Service in Double Tread Tires

Send us your old Tires and we will Double Tread same for you at prices quoted below:

	When You Furnish One	When You Furnish Both	Complete Double Tread Tire
28x3.....	\$3.20	\$1.50	\$4.70
30x3.....	3.65	2.00	5.65
30x3 1/2.....	4.35	2.50	6.85
32x3 1/2.....	4.50	2.50	7.00
31x4.....	4.95	2.50	7.40
32x4.....	5.25	2.75	8.00
33x4.....	5.50	3.00	8.50
34x4.....	5.90	3.00	8.90
35x4.....	6.30	3.00	9.30
36x4.....	7.00	3.00	10.00
34x4 1/2.....	7.50	3.50	11.00
35x4 1/2.....	8.00	3.50	11.50
36x4 1/2.....	8.50	3.50	12.00
35x5.....	8.50	4.00	12.50
36x5.....	9.00	4.00	13.00
37x5.....	9.50	4.00	13.50

10% more for Non-Skid.

One dollar deposit, or sufficient to cover express charges, required with each order for complete tires. Shipments made promptly, with privilege of examination.

Modern Double Tread Tire Co.
75-77 E. 16th St. Chicago, Ill.

THE Auto Parts Company

OMAHA, NEBRASKA

BRANCHES:

AUTO PARTS CO., 343 S. Eleventh Street
SIOUX CITY AUTO PARTS CO., 612 Pearl St.
TWIN CITY AUTO PARTS CO., 1215 Hennepin Ave.

Lincoln, Neb.
Sioux City, Ia.
Minneapolis, Minn.

50 to 75%

SAVING ON ALL PARTS FOR ANY
Standard or Orphan Make

We have parts for all the following makes of cars, and a great many others:

Buick F-19-14-17-19-25-29	Auburn 1909 to '14, Inc.
Overland 37 to 79, Inc.	Everett 4-30-Brush
Flanders 2 and 3 speed	Apperson 50
E.M.F.—Studebaker 25	National 50
Maxwell A-B-I-E-K-G-A	Great Western
Mascotte & Mercury	Cutting
Chalmers F-K-M-N-J	Imperial
and 34	Interstate 14 to 13, Inc.
Mitchell T-J-H-K and 8	Paige 25 and 30
Regal 30 & Underlung	Moon 1913
Stevens U & X—R.C.H.	Midland
Hupp 20 and 32	Marion
Rambler 34-54	Abbott
Stoddard 20 and 30	Carter Car
Reo 1916 to '13, Inc.	Elmore
Oakland 24-25-33-35-40	Mason-Pratt 40
and 42	Halliday
Cadillac 1909 to '12, Inc.	Pope-Hartford
Jackson 32-33-35-40 & 50	Mets-Richmond
Hudson 20-21-33	Warren-Detroit
Vellie 30 and 40, 1909 to	Mercury
'12, Inc.	Fords, T. R. N. S
Spaulding	Staver Chicago
Krit 2 and 3 speed	Oldsmobile 50 and 60

Absolutely No Delay

We ship your order immediately. Because our organization is the highest class, and because of the branches in the different parts of the country, we are enabled to give you better, quicker and more satisfactory service. Write, phone or wire us.

MOTORS

Buick 17.....	\$50	Regal Underlung.....	\$50
Interstate 13.....	80	R. C. H., Bosch	80
Overland 61.....	75	Ignition.....	80
Overland 52.....	75	Cutting 35 T.....	65
Continental 25.....	70	Herrshoff Unit	70
Studebaker 35.....	75	Power Plant, 20	75
Studebaker 25.....	60	H. P.....	75
Rutener 30.....	60	Northway 40 Unit	75
Buick 43.....	150	Power Plant, Del-	125
Vellie 40.....	45	co Starter.....	125
Buick 10.....	75	Mitchell Baby Six.....	100
Overland 79.....	75	Cadillac, 1911.....	100
E. M. F.....	60	Continental 30.....	70
Flanders, 2 & 3 spd.	50	Buick 31 Unit Power	90
		Plant.....	90

HAVE 50 MOTORS ON HAND AT PRESENT

BOSCH MAGNETOS

DU and DR4's.....	\$25	DU and DR6's.....	\$70
DU and DR4's, Dual.....	30	DU and DR6's, Dual.....	35

REAR AXLES

Weston Mott 20.....	\$25	Overland 69 & trans-	60
Weston Mott 40.....	35	mission.....	60
Timken Vellie 40.....	40	Buick '13 Full Float-	50
Timken Cadillac 12.....	30	ing.....	50
Mitchell Full Float-	40	Jackson 1913.....	40
ing 40.....	45	Chalmers K & F	40
Moon '13 Full Float-	40	Timken.....	40
ing 40.....	40	Hupp 20.....	35

These are some of the 50 Rear Ends we have on hand at present

MAGNETOS—Bosch, Dixie, K. W., Splitdorf, Remy, etc.

CARBURETORS—Rayfield, Master, Schebler, Stromberg, Zenith, etc.

RADIATORS—Honey-combed and tubular, \$12.50 to \$20.00.

BEARINGS—All sizes and makes.

TRANSMISSIONS—Reo, Olds, Brown & Lipe, Warren, Hudson 20, Buick 17 and 19, Chalmers Jr., Lexington and many others.

Insure yourself by placing your order with us. All our parts are guaranteed. Satisfaction or money refunded.

Come! Let's Get Together
Right Now!

WE CAN FURNISH YOU

TODAY

best quality serviceable

PARTS

for all the following makes of cars and many others:

BUICK, Models 16-17-19-25-29-27-14-30-40.
CHALMERS, Models F-K-M-30-36-40.
CADILLAC, Models 1909-1910-1911-1912.
MAXWELL, Models A-AA-AB-D-K-E-I-G-22-Mascotte and Special-2.
MITCHELL, Models T-R-K-H-S 6 cyl. 1912 6 cyl.
OVERLAND, Models 30-31-33-40-42-52-50-41-60.
STUDEBAKER, Models EMF 30, Flanders 20-4-14-1915-25 and 1913-25.
Auburn 1911 & '12, Bergdoll, Chase, Courier, Cole 30, Crow Elkhart, Dorris, Elmore, Everett 30, Glide, Garford 30 & 40, Jackson 35 & H. Jeffery, Krit, Lozier, Marion 1912, Moline, Midland, Marathon, Moon, National, Ohio 1910, Oakland 25 & 40, Olds, Paige 25, Perry, Premier 4, Packard 1907 to '10, Rapid Truck, Regals 1909 to '14, Ramblers, Reo 1910 & '11, R.C.H., Studebaker 25, Staver 1913, Stoddard-Dayton, Vellie '10-40 & '11.

Save on Manufacturers' Price Lists

50% AND MORE

If you're the man who appreciates first-class merchandise that will stand up—At serviceable parts—if you're the man who wants his order shipped out the same day received; and have his order filled correctly; if you're the man who wants his money back without any trouble when dissatisfied with the goods—

Then You're Just the Man We Want

We're equipped to handle your order to your entire satisfaction.

Our Parts Give Same Service as New Parts

BIG BARGAINS in Motors, Parts,

Accessories

COMPLETE ENGINES

Mitchell 6, 1912.....	\$100	E. M. F. 30.....	\$ 50
Flanders 20.....	50	Kline 6 cyl.....	125
Cadillac, 1909.....	65	Hudson 33.....	125
R. C. H.....	50	Jeffery.....	100
Overland, 43.....	80	Imperial.....	125
Mitchell, T, 1911.....	75	Premier, 6 cyl.....	125
Cadillac, 1912.....	90		

Will sell most any part from these engines. We have a large stock of engines and will trade engines with you.

PRESTO TANKS, size "B," filled, \$8.

NEW PISTON RINGS, 25c each.

For any size—Over-size, 30c each.

REAR AXLES, complete, \$30 to \$65.

BOSCH MAGNETOS, \$30 to \$35.

RADIATORS, \$12 to \$20, all kinds, good shape.

CARBURETORS, any make, \$1 to \$15.

We tear down old cars for parts; we throw away all worn-out and unserviceable parts, and save.

BEARINGS, any make, \$1 to \$15.

CYLINDERS, ALL CONDITION, almost any car.

WHEELS, \$1.00 to \$5.

Any size or style.

Spring, \$1.50 to \$2.50.

Spring leaves, 25c to 50c.

(Give length & width).

Only Good, Serviceable Parts

IF YOU'RE IN A HURRY

just take your parts book of your car and deduct 1/2 of the price in there and write, wire or phone us the order. We will ship parts the same day your order is received.

THE AUTO PARTS CO.

Incorporated

4116-18 Olive St., ST. LOUIS, MO.
325 West 2nd Street, DAVENPORT, IA.

When Writing to Advertisers, Please Mention Motor Age

REAL — UNSURPASSED SERVICE

—Is Made Possible Only by—
The World's Largest

NEW and USED

AUTO PARTS HOUSE

The

Auto Salvage Co.

INCORPORATED

The Originators of the Auto Salvage Business

17th & Main, Kansas City, Mo.

2823-25 Locust, St. Louis, Mo.

314-16 E. 3rd, Cincinnati, Ohio

Write to Nearest Office

THEN WHY TAKE A CHANCE
AND WASTE YOUR TIME

ELSEWHERE? : : : : : : : : : :

When writing to us, it will not be a case of "maybe they got it and maybe they haven't"—because—WE HAVE IT—if it is to be had at all.

ALL PARTS AT

50 to 75%

Off Manufacturers' Price List

ALL PARTS FOR THE FOLLOWING
MAKES OF CARS AND MANY OTHERS

Write Us Your Wants

Apperson 50-5-1-Bergdoll	Maxwell A-G-K-GA-
Buick 10, 16, 17, 19, 21, 25,	GE-E-Special-40-LC
33, 39	Marmon 30-Mascotte
Brush	Moon, '11-'12-'13
Cadillac 1909, '10 and '11	Mitchell, all models
Case-Carter Car	Matheson 6 cyl.
Chadwick-Chase	Model Engine
Crow Elkhart-Cole 6	Marquette-National
Chalmers F, K, M, 10,	Ohio
16, 18, 24, 35, E, J, L	Oakland 30, 42, 60
Cino-F. A. L.	Oldsmobile 30, 40, Special
EMF, 1909 to 1912	Overland 37, 38, 41, 42, 50,
Elmore	69, 79-Ohio
Flanders 2 and 3 speed	Pierce-Arrow 1909 to 1912
Ford N R S and T	Pope-Hartford-Packard
Franklin, prior to 1912	Peerless-Paige 36
Glason-Glide	Pope-Toledo-Premier 6
Garford-Great Eagle	Rambler 30 and 54
Great Northern	Reo, 1909 to 1913
Great Smith-Henderson	R. C. H., 1911, '10 and '13
Hudson 6-54, 20	Stafford-Selden
Haynes 1913	Stevens Duryea R, X, Y
Herrf-Brooks	Stearns, 30 and 30-60
Hupp 20 & 32	Stoddard Dayton, all
Interstate 30 and 40	models exc. Knight
Jackson 1910, '11 and '12	Stutz-Speedwell
Knox	Thomas Detroit
KisselKar 4 and 6 cyl.	Vellie 30 and 40
Locomobile, all models	Warren-Wayne 40

We have a great stock of complete rear axles, complete motors, transmissions, transmission cases, crank cases, crank shafts, disc clutches, transmission gears, bearings, axle shafts, cylinders, cam shafts, radiators, connecting rods, magnetos, coils, carburetors, wheels, hubs, rims, springs, etc., at 50 to 75 per cent off the manufacturers' list price.

OUR GUARANTEE:

You Must Be Satisfied. Any article purchased from us, which does not in your opinion give satisfaction or fit, can be returned to us at our expense, and your money will be cheerfully refunded.

FREE Write for new catalog, listing parts and accessories. We can save you money. Write for it today to nearest office. If not of use now, keep it on hand for future reference.

BETTER SERVICE:

Our big business has been the result of giving immediate attention to all orders, no matter how large or small. We can fill your order and have it in the expressman's hands in 4 hours after it reaches our office. Write, wire or phone.

Repair Parts

WE
SAVE
YOU
50% TO

75%

"We Tear 'Em Up and Sell the Pieces"

MOTORS

Rambler 44.....	\$ 50.00	Overland 59.....	\$ 75.00
E. M. F. 30.....	50.00	Overland 69.....	75.00
Regal 30.....	50.00	Overland 79.....	75.00
Case 1911.....	75.00	Overland 81.....	75.00
Selden, 36 H.P.....	75.00	Overland 83.....	75.00
Carter Car 1913.....	75.00	Peerless 40.....	75.00
Locomobile 1910.....	75.00	Moon 1912.....	75.00
Velie 40, 1912.....	85.00	Mitchell 4-40.....	75.00
Packard 18.....	125.00	Mitchell 6-1912.....	100.00
Chalmers 6-1915.....	150.00	Packard 30.....	150.00
Apperson 8 cyl.....	200.00	Apperson 6-48.....	150.00
Nyberg, 37 Unit Plant.....	100.00		
Ohio Unit Plant.....	100.00		
Menominee Truck Unit Plant.....	100.00		
Lexington 1914, Unit Plant.....	125.00		
King, 1914, Unit Plant.....	125.00		
Chalmers 36 Unit Plant, 4 speed.....	125.00		
Buick D 55, 6 cyl., Unit Plant.....	200.00		
Oldsmobile 8 cyl., Unit Plant.....	250.00		

MAGNETOS

\$5.00 to \$25.00

FRONT AXLES

\$5.00 to \$10.00

TRANSMISSIONS

\$25.00 to \$50.00

GEARS

Send old samples.

50c to \$10.00

GASOLINE TANKS

Round, 12x35 in.,

\$4.00

RELINERS

30x3 1/2 & smaller.....\$1.00

32x3 1/2 & larger.....1.50

REAR AXLES

\$25.00 to \$50.00

RADIATORS

\$12.50 to \$20.00

CARBURETORS

\$5.00 to \$15.00

BEARINGS

Send old samples.

50c to \$5.00

WINDSHIELDS

New and second-hand

\$4.00 to \$10.00

PATCHES

3x3 1/2 in.....\$0.15

4x4 1/2 in......20

Some of the Cars We Have Parts For

Apperson	Locomobile
Adams Truck	Lexington
Auburn	Lambert
Abbott Detroit	Matheson Six
Buick	Moon
Briscoe	Metz
Black Crow	Marathon
Bergdoll	Maxwell
Brush	Mitchell
Carter Car	Ohio
Cadillac	Oakland
Case	Overland
Cutting	Oldsmobile
Cole	Paige
Crawford	Palmer-Singer
Chalmers	Peerless
Detroit	Packard
Dodge	Parry
Everett	Pope-Hartford
E. M. F. 30	Pierce-Arrow
Flanders	Reo
Firestone Columbus	R. C. H.
Franklin	Regal
Ford, N. R. S	Rambler
Great Western	Royal Tourist
Glide	Speedwell
Groat Eagle	Stoddard-Dayton
Gleason	Studebaker
Great Smith	Stearns
Garford	Selden
Haynes	Stevens
Imperial	Thomas Detroit
Interstate	Velie
Jackson	Welch
King	Warren 30
Krit	Winton 6
Kissel	Wilcox Truck
Knox	

All Parts Guaranteed in Good Shape
Money Refunded if Not Satisfactory

WRITE!

Send list of parts wanted for special quotation.
Our immense stock is constantly changing and growing.

Auto Wrecking Co.
13th and Oak, Kansas City, Mo.

FANS (TO FIT)

Abbott M/44 H.P.....	\$5.00
Bergdoll 30 H.P.....	5.00
Chalmers 40 H.P., '07, '08, '09, '10, '11	5.00
Chalmers 30 H.P., '09, '10, '11..	5.00
Chalmers 36 H.P., '12, '13, '14..	5.00
Chalmers Master Six.....	5.00
Grabowsky Truck	8.00

All of the above FANS are complete with shaft, ready to be installed on cars. They were formerly manufactured by McCord Company of Detroit, Mich.

Blades and Rim are a sheet steel stamping with an aluminum hub. Cones are made from Tool Steel; shafts from 35% carbon steel.

We also maintain in stock complete FANS to fit:—

**WARREN
PENNSYLVANIA
EWING
HUDSON
VELIE
R-C-H
PULLMAN
OLDSMOBILE, Etc.**

All FANS listed above are absolutely brand new. We do not carry any second hand or junk parts.

They are also guaranteed against defects for one year.

Have you received our former bulletins? If not, write us at once. They are of vital interest to Owners, Repair Shops or Garages all over the country. They will save you time, labor and expense and give you real "service."

Bulletin No. 13

J. C. Gorey & Co.
356 W. 50th St., New York City

When Writing to Advertisers, Please Mention Motor Age

YOU CAN'T BEAT OUR PRICES

PARTS

FOR ALL CARS

can be obtained from us at
A SAVINGS OF

50 to 80%

Money Cheerfully Refunded

If We Satisfy You, Tell Others—
If Not, Tell Us

LOOK!!

at the following Bargains:

MOTORS

4 cyl. Continental block motor.....	\$100.00
4 cyl. Wisconsin motor.....	100.00
6 cyl. Wisconsin motor.....	125.00
R. C. H. motor.....	45.00
1912 Cole Unit Power Plant.....	75.00
1914 Cole 6 cyl. Unit Power Plant.....	125.00
Hudson 33.....	65.00
E. M. F. motors.....	65.00
Flanders.....	60.00
1912 Buick motors.....	100.00
4 cyl. Excelsior motor.....	85.00

OVER 500 MOTORS IN STOCK

So Let Us Know Your Needs

BOSCH MAGNETOS

DU 4 Set Spark.....	\$ 14.00
DR 4 & 6.....	17.50
D 4 & 6 Single or Dual.....	16.00
DR 4 & DU 4 Variable Spark.....	20.00
Eisemann H. T. Magn.....	18.00
Romy Mod. RL and D.....	7.00
New 6 cyl. Romy Distributors.....	5.00
Dixie Magn.....	12.00

COILS

Bosch Type A.....	\$ 5.40
Eisemann.....	4.00
Spittler.....	3.50

B-Presto Tanks\$5.00

We Carry in Stock

ALL MAGNETO PARTS

REAR AXLES

Any style or make.....\$15 to \$25

SPEEDOMETER HEADS

Stewart or Warner.....\$1.50 to \$4.00
We wreck from 10 to 15 cars Every Day and thus obtain Hundreds of slightly used

RIMS—All Styles and Makes

Continental.....	\$2.50
All other makes.....	1.50

TIRES AND TUBES

Which Are Good for Thousands of Miles of Service

ARE YOU LUCKY

enough to need the following sizes?

32x4.....	5.00	34x4.....	6.00
34x3 1/2.....	5.50	34x4.....	6.00

Prices on Other Sizes Will Interest You

MAIL ORDERS SHIPPED SAME DAY

Highest Prices Paid for Wrecked Cars

Warshawsky & Co.

Largest Car Wreckers in Chicago

1925 S. State St. CHICAGO, ILL.
TWO PHONES—CAL 1388; CAL 6794

HERCULES TIRES 4000 MILES

GUARANTEED

Read Our Liberal Guarantee as Follows:
If a tire fails to run 4,000 miles we will replace it with another tire for one-half regular price.

Size	Plain	Non-Skid	Tubes
28x3.....	\$ 6.80	\$ 7.20	\$ 1.82
30x3.....	7.20	7.60	1.93
30x3 1/2.....	9.30	9.75	2.16
32x3 1/2.....	10.70	11.20	2.27
34x3 1/2.....	11.95	12.55	2.42
31x4.....	14.35	15.10	2.97
32x4.....	14.60	15.35	3.07
35x4.....	15.25	16.00	3.14
34x4.....	15.55	16.25	3.23
35x4.....	16.35	16.95	3.33
36x4.....	16.85	17.25	3.37
34x4 1/2.....	20.80	21.85	4.05
35x4 1/2.....	21.60	22.70	4.15
36x4 1/2.....	21.90	22.95	4.17
37x4 1/2.....	22.70	23.80	4.27
36x5.....	24.95	26.15	4.97
37x5.....	25.85	27.15	5.07

Specify When Ordering Whether Clincher,
Q. D. Clincher or Straight Side.
2% discount allowed for cash in full with order.
Otherwise, 10% deposit required with order,
Balance C. O. D.

PROMPT SHIPMENTS

Live Dealers—Get Our Money-Making
Proposition TODAY

HERCULES TIRE CO.
2128 S. Michigan Ave., Chicago, Ill.

SPECIAL SALE 5000 TUBES

ALL NEW GUARANTEED

Size	Plain	Non-Skid	Tubes
28x3.....	\$1.50	\$1.75	\$0.25
30x3.....	1.60	1.85	0.25
30x3 1/2.....	1.75	2.00	0.30
31x3 1/2.....	1.85	2.10	0.30
32x3 1/2.....	1.90	2.15	0.30
34x3 1/2.....	2.00	2.25	0.35
31x4.....	2.25	2.50	0.40
32x4.....	2.30	2.55	0.40
35x4.....	2.40	2.65	0.40
34x4.....	2.45	2.70	0.40
35x4.....	2.50	2.75	0.40
36x4.....	2.60	2.85	0.40
34x4 1/2.....	2.80	3.05	0.45
35x4 1/2.....	2.90	3.15	0.45
36x4 1/2.....	3.00	3.25	0.45
37x4 1/2.....	3.10	3.35	0.45
36x5.....	3.30	3.55	0.50
37x5.....	3.40	3.65	0.50

25% Deposit Required, Balance C. O. D.
SERVICE TUBE CO.
2126 Michigan Ave. Chicago, Ill.

OUR GUARANTEE

If a Tire Fails to Run
5000 MILES

We will replace it with another tire
for one-half the price marked below:

Size	Non-Skid	Tubes
28x3.....	\$ 7.95	\$2.25
30x3.....	8.90	2.34
30x3 1/2.....	10.50	2.66
31x3 1/2.....	11.50	2.70
32x3 1/2.....	12.95	2.79
34x3 1/2.....	14.80	2.92
31x4.....	16.80	3.65
32x4.....	17.95	3.78
33x4.....	18.40	3.87
34x4.....	18.95	3.96
35x4.....	19.50	4.05
36x4.....	20.30	4.15
34x4 1/2.....	22.00	4.95
35x4 1/2.....	23.50	5.05
36x4 1/2.....	24.10	5.15
37x4 1/2.....	25.50	5.25
35x5.....	27.50	6.05
36x5.....	28.80	6.10
37x5.....	29.50	6.25

2% discount allowed for cash in full with order.
Otherwise, 10% deposit required with order,
Balance C. O. D.

SPECIAL PROPOSITION TO LIVE DEALERS
Auto Tire & Rubber Co.

3546 S. Michigan Ave.
CHICAGO, ILL.

1779 Broadway
NEW YORK, N. Y.

ENGER Owners

We are exclusive owners of all patterns, engineering records, etc., from which Enger cars were made. We alone can furnish prompt, accurate and dependable service on Enger repairs.

ENGER MOTOR CAR CO.
INDIANAPOLIS INDIANA

American Owners

We are exclusive owners of all patterns, engineering records, etc., from which American cars were made. We alone can furnish prompt, accurate and dependable service on American repairs.

AMERICAN MOTOR PARTS CO.
INDIANAPOLIS INDIANA

Marion Owners

We are exclusive owners of all patterns, engineering records, etc., from which Marion cars were made. We alone can furnish prompt, accurate and dependable service on Marion repairs.

MARION MOTOR SERVICE CO.
INDIANAPOLIS INDIANA

Bimel-Elco Owners

We are exclusive owners of all patterns, engineering records, etc., from which Bimel-Elco cars were made. We alone can furnish prompt, accurate and dependable service on Bimel-Elco repairs.

BIMEL AUTOMOBILE COMPANY
INDIANAPOLIS INDIANA

De Tangle Owners

We are exclusive owners of all patterns, engineering records, etc., from which De Tangle cars were made. We alone can furnish prompt, accurate and dependable service on De Tangle repairs.

DE TANGLE MOTORS CO.
INDIANAPOLIS INDIANA

Herreshoff Owners

We are exclusive owners of all patterns, engineering records, etc., from which Herreshoff cars were made. We alone can furnish prompt, accurate and dependable service on Herreshoff repairs.

HERRESHOFF MOTOR CO.
INDIANAPOLIS INDIANA

L-P-C Owners

We are exclusive owners of all patterns, engineering records, etc., from which L-P-C cars were made. We alone can furnish prompt, accurate and dependable service on L-P-C repairs.

L-P-C MOTOR CO.
INDIANAPOLIS INDIANA

PARTS AND REPAIRS

Gears and Axle Shafts

We carry in stock for immediate shipment transmission gears and shafts, rear axle gears and shafts, for the following makes of cars:

ABBOTT
AEROCAR
ALLEN
AMERICAN
AMES
APPERSON
ATLAS
ATTERBURY
AUBURN
BADGEN
BERGDOLL
BERKSHIRE
BUICK
CADILLAC
CARHART
CASE
CARNATION
CHALMERS
CHEVROLET
COLE
COREJA
COURIER
CRESCENT
CROW
CROXTON
CUTTING
DAVIS
DE TANGLE
DIAMOND
DOLSON
ELMORE
EMPIRE
ENGER
EVERETT
F. A. L.
FEDERAL
FIRESTONE
FLANDERS
GLIDE
GRANT
GREAT WESTERN
HALLIDAY
HAVERS
HENDERSON
HENRY
HUDSON
HUPMOBILE
IMPERIAL
INTERSTATE
JACKSON
KELLY
KING
KISSEL
K-R-I-T

LEXINGTON
LITTLE
LOUVERNE
McFARLAN
MARATHON
MARION
MAXWELL
METEOR
MICHIGAN
MIDLAND
MILLER
MOON
MOLINE
MOYER
NYBERG
OAKLAND
OHIO
OMAHA
OVERLAND
PAIGE
PALMER-SINGER
PARRY
PARTIN-PALMER
PATHFINDER
FENN
PATERSON
PILOT
R. C. H.
REGAL
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end)	69, 79
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Cadillac, 1911.....	\$125	Hupp 20.....	\$ 80
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50% to 75%

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We have in stock at the present time parts for over 500 different models and makes of automobiles. Our slogan is "We Undersell Everyone."

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Chalmers 30-F, K, M	Interstate-Jackson
36-40-Master Six	Abbott Detroit
Studebaker-Garford	Courier-Glide
E-M-F 30-Flanders	Buick, 10-17-19-30
Dorris, 1906 to '09	Moon 30-40-45 & C
Pearless, 1906 to '13	Maxwell, all models to 13
Stoddard-Dayton	Packard, 1905 to 1912
Cole, 4-50-1913; 6-1913	Pierce-Arrow, '07-'12
30-1912; 40-1914	Hudson, 20, 33, 37, 6-54
Marion, 1909 to 1912	Ohio-Regal
National, '10 to '13	Bergdoll-Staver
Franklin, '05 to '11	Allen, '15 and '16
Hup, 20 & K	Atlas-Speedwell
King, '11-'12-'13	Mitchell, 1908 to '13
Paige, 25-26	Thomas, all models
Standard, 6	Great Western-R. C. H.
Stevens-Duryea	Oldsmobile Special
Midland-Wayne-Welch	Limited-Autocrat
Selden-Speedwell	Defender-42 and 43
Stearns, 30 to 60	American Underslung
Kissel 6-Matheson	30 to 50-Scout
Amplex, all models	Case 40 Holiday
Pope Toledo	Haynes-Carter Car
Oakland 30 & 40	Overland 38-40-41-42-43
Pope Hartford	46-51-53-54-55-56-59-
Reo, 1908 to '13	60-69-71
Glide-Warren	

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AUTO SPRINGS. All Types, \$1 to \$4.
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GUARANTEE—Every part we ship is carefully examined or tested, and nothing but the very best is shipped out.

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To All Owners of

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MAXWELL 6-50 MAXWELL 4-35
FLANDERS "SIX" BRUSH
COURIER-CAR COLUMBIA
COURIER CLERMONT
SAMPSON "35" MOTOR CARS
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Better service will be given than ever before, and many reductions in repair parts prices have been effected.

Address all orders and inquiries direct to the
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FRANK F. MATHESON
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We are overstocked on some lines of goods and for quick sale offer them at the following bed-rock prices:

17½ set (4 to a set) Gemco Economy Shock Absorbers for Fords—	Regular price, \$8.75; sales price \$2.75
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All of the above stock offered subject to prior sale.

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2-15	Westinghouse, Type CCL.....1750
2-15	Watson, slip-ring, var. speed.....1720
1-15	Fairbanks-Morse.....1200
1-15	General Electric, Form L.....1200
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3-15	Fairbanks-Morse, slip-ring, constant speed.....1200
1-15	Westinghouse, vertical.....1135
2-15	Allis-Chalmers.....1130
2-15	Allis-Chalmers.....850
2-15	Westinghouse.....1750
4-20	Westinghouse.....1750
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Send for Monthly Bargain Sheet showing complete stock and net prices.

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Overland 69 Motor.....	\$75.00
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Model 69 Overland Parts Cheap.

Axles, Pistons, Connecting Rods, Crankshafts, Engines and Transmission Gears.

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Give Measurement in Ordering Parts

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170 new, modern type, five-passenger Touring car bodies; also 95 four-passenger Roadster bodies of Speedster design. Bodies in the lead or painted to suit. Designed for car with wheel base from 112 to 118 inches. Will make extremely low price on sale of all or part of lot.

Box 723—c/o Motor Age

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20 Full Scroll Springs, 2x38, 6 leaf, regular price, \$9.00; special.....\$ 3.75
20 1/4 Scroll Springs, 53", 9 leaf.....\$ 3.75

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7 new 6-cyl. 4x4 1/2, with clutch and water pump suitable for truck, tractor or boat... 120.00
6 new 4-cyl. 4x5 motors with clutch..... 120.00
18 new 4-cyl. 24x4, suitable for boats..... 33.00
New 34x4 Wheels, Q. D. rims, set 4..... 10.00
Piston Rings for Fords, per 100..... 6.00
1-cyl. Kellogg Engine Tire Pumps..... 8.00
New 5-pass. Bodies, 92" and 100" long, not upholstered..... 10.00
20 2" Nickel Channel Universal Bumpers; fits all cars, regular \$12.00; special..... 5.95
10 new H-2 1 1/4 Stromberg Carburetors, regular \$25.00; special..... 14.95
40 new Mayer 1" Carburetors, regular \$11.00; special..... 4.45
New L. H. Steering Gears, 55" long, 18" Wheel, regular \$45.00; special..... 19.50
50 Inclosed Universal Joints, 1 1/4 R. by 1 1/4" square hole; regular \$11.00, special..... 4.50
New Honeycomb Radiators at a saving of at least 25%. Send sketch and model of car.

We furnish Gears and Bearings for all cars. Cylinders ground and Pistons fitted. A complete stock of Rings always on hand. Get our Special List and No. 10 Catalogue.

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our specialty. We have a very large stock of the above.

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COMPLETE, with Side Curtains and Dust Boot.

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Packard, Cadillac, Buick and other parts, all

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Complete motors.....\$15.00 to \$75.00
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Elmore 30..... 45	Beaver 40..... 95
Overland 30..... 30	Buick 19..... 65
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750 LBS. CAPACITY. Iron Clad batteries; less than one year old. Chain drive. Cost about \$1500; will sell for \$550. In fine shape. A bargain at this price.

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GEARS FOR ALL MAKES OF CARS.
SEND IN YOUR OLD ONES.**

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SAVE YOUR MONEY—Buy your Transmission and Differential Parts from us, 30% discount allowed from list on all rear axle parts.

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**PARTS
50 TO 75%
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For All Standard and Orphan Cars—Any part you want. Motors: Flanders 20, \$35; E.M.F. 30, \$35; Chalmers 4-40, \$35; Overland 51, \$45. 25 first-class motors, complete, best shape, \$30 to \$135. Bosch Magnetos: DR4, \$22.50; D4, \$20; D1/4, \$25; other makes, \$5 to \$10. Axles, Radiators, Gears, Carburetors, etc. Best Service. **AUTO WRECKING & METAL CO., 525-34 Broadway, Denver, Colorado.**

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Crankcases, Camshafts, Cylinders, Axles, Gears,
Bearings, Pistons, Springs, etc., for Standard
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UNTIL YOU GET OUR PRICES**

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WITH HIGHEST GRADE EQUIPMENT
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on special crankshaft grinders—not filed and lapped, but REGROUND.

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New lightweight pistons and rings fitted. All our new pistons are **HEAT-TREATED and GROUND.**
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By expert machinists on specially designed machines, insuring absolute accuracy and the highest attainable quality of finish. Special heat-treated extra light new pistons, and re-turned rings fitted without extra charge. Wrist pins to order. Reboring, autos, \$4.50 to \$9.50 per cylinder; special price on Fords. Equipped to rebore all makes of stationary, tractor and motorcycle engines. Write us, **PARK MACHINE CO.**
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Read Our Liberal Guarantee as Follows:

If a tire fails to run 4,000 miles we will replace it with another tire for one-half regular price.

	Plain	Non-Skid	Tubes
28x3.....	\$ 6.80	\$ 7.20	\$ 1.82
30x3.....	7.20	7.60	1.93
30x3½.....	9.30	9.75	2.16
32x3½.....	10.70	11.20	2.27
34x3½.....	11.95	12.55	2.42
31x4.....	14.35	15.10	2.97
32x4.....	14.00	15.35	3.07
33x4.....	15.25	16.00	3.14
34x4.....	15.55	16.25	3.23
35x4.....	16.35	16.95	3.33
36x4.....	16.35	17.25	3.37
34x4½.....	20.00	21.85	4.06
35x4½.....	21.60	22.70	4.13
36x4½.....	21.90	22.95	4.17
37x4½.....	22.70	23.80	4.27
38x5.....	24.95	26.15	4.97
37x5.....	25.65	27.15	5.07

Specify When Ordering Whether Clincher, Q. D. Clincher or Straight Side

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at the following prices without a guarantee. However, if you want a **GUARANTEE FOR 3,000 MILES**, add 20 per cent to these prices.

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Size	Plain	Tubes	Size	Plain	Tubes
30x3.....	\$ 7.25	\$2.00	35x4.....	\$16.35	\$3.75
30x3½.....	9.35	2.30	36x4.....	16.70	3.85
31x3½.....	10.15	2.55	34x4½.....	20.35	4.15
32x3½.....	10.80	2.45	35x4½.....	21.45	4.30
34x3½.....	12.00	2.70	36x4½.....	22.00	4.30
31x4.....	14.50	3.20	37x4½.....	22.80	4.60
32x4.....	14.55	3.35	35x5.....	23.10	4.65
33x4.....	15.15	3.50	36x5.....	23.95	4.75
34x4.....	15.55	3.65	37x5.....	24.80	4.95

Add 10% to the above prices for non-skid tires. Order today—\$1 deposit required. Tires shipped by return express subject to examination. Specify whether Q. D., Clincher or Straight Side Rim.

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Phone: Cal. 5212; Cal. 2190

Bargains in

SLIGHTLY USED AND FACTORY REPAIRED

Tires and Tubes

Size	Tires	Tubes	Size	Tires	Tubes
30x3.....	\$ 4.25	\$1.35	31x4½.....	\$ 8.50	\$1.90
30x3½.....	5.00	1.45	34x4½.....	8.90	1.85
31x3½.....	5.50	1.45	35x4½.....	8.75	1.90
32x3½.....	5.75	1.50	36x4½.....	9.00	1.90
34x3½.....	6.50	1.55	37x4½.....	9.25	1.95
31x4.....	6.75	1.60	40x4½.....	11.00	2.00
32x4.....	7.00	1.65	42x4½.....	11.00	2.00
33x4.....	7.25	1.75	35x5.....	9.75	2.00
34x4.....	7.50	1.85	36x5.....	10.50	2.05
36x4.....	8.25	1.85	37x5.....	11.00	2.10

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BLEMISHED & SECOND TIRES**

Size	Plain	Non-Skid	Size	Plain	Non-Skid
28x3.....	\$ 6.75	\$ 7.10	35x4.....	\$16.25	\$16.75
30x3.....	7.10	7.50	36x4.....	16.75	17.00
30x3½.....	8.50	9.25	37x4.....	17.00	17.75
31x3½.....	9.50	10.25	33x4½.....	18.00	19.50
32x3½.....	10.50	11.00	34x4½.....	20.00	21.75
34x3½.....	11.75	12.50	35x4½.....	21.50	22.50
30x4.....	12.00	12.75	36x4½.....	21.75	22.75
31x4.....	14.25	15.00	37x4½.....	22.60	23.60
32x4.....	14.50	15.25	35x5.....	24.50	25.75
33x4.....	15.00	15.75	36x5.....	24.75	26.00
34x4.....	15.25	16.00	37x5.....	25.70	27.00

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These Sizes in New Standard Make

Tires

—ALL NEW, FRESH STOCK—

34x3½ Q. D. Cl.	\$11.35	34x4½ Q. D. Cl.	\$14.75
31x4 S. S.	12.75	35x4½ Q. D. Cl.	19.90
32x4 Q. D. Cl.	13.00	36x4½ Q. D. Cl.	19.95
33x4 Q. D. Cl.	13.40	37x4½ Q. D. Cl.	20.75
34x4 Q. D. Cl.	13.95	35x5 Q. D. Cl.	22.40
35x4 Q. D. Cl.	15.00	36x5 Q. D. Cl.	23.00
36x4 Q. D. Cl.	14.85	37x5 Q. D. Cl.	23.70
33x4½ Q. D. Cl.	18.15		

Extra Good Slightly Used Tires

**NO JUNK—All Our Used Tires Are in All
Condition**

28x3.....	\$ 3.50	32x4.....	\$ 7.50	35x4½.....	\$10.00
30x3.....	4.00	33x4.....	8.50	36x4½.....	10.00
30x3½.....	5.00	34x4.....	9.00	37x4½.....	10.50
32x3½.....	7.00	35x4.....	9.00	33x5.....	11.00
34x3½.....	7.00	36x4.....	9.00	36x5.....	12.00
31x4.....	7.50	34x4½.....	10.00	37x5.....	12.00

Orders shipped immediately. Send \$1.00 deposit for each tire ordered, balance C. O. D., subject to examination.

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**GUARANTEED
4,000 MILES**

If our tires fail to run 4000 miles we will replace it with another tire for one-half regular price.

Non-			Non-		
Size	Plain	Skid	Size	Plain	Skid
30x3....	\$6.50	\$7.50	34x4....	\$12.95	\$13.95
30x3½..	7.95	8.95	35x4....	13.45	14.95
32x3½..	8.95	9.90	36x4....	13.95	15.50
34x3½..	9.60	10.45	34x4½..	16.95	18.95
36x3½..	10.45	11.85	35x4½..	17.45	19.45
30x4....	11.20	12.10	36x4½..	17.95	19.95
31x4....	11.45	12.60	37x4½..	18.45	20.45
32x4....	11.95	12.95	35x5....	19.45	21.95
33x4....	12.45	13.50	37x5....	20.45	23.25

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—LET US TIRE YOU—

**AND YOU WILL NOT
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Guaranteed Standard Makes

AT WHOLESALE PRICES

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30x3 N. S. \$5.90
30x3½ N. S. 7.60

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HAVE YOU

ANY OLD TIRES?

We Retread them with a New Non-Skid

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Guaranteed for
3500 MILES

Full particulars on request.

Belle City Auto Tire and Repair Company
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Best Rebuilt Tires AT ¼ PRICE

WILL RUN 5,000 MILES AND MORE

These tires are of double thickness and have 12 plies of fabric, therefore no punctures, no blow-outs. They are rebuilt by our special process, vulcanized and double treaded.

30x3.....\$5.00 32x3½.....\$6.50 34x4.....\$8.25
30x3½.....6.00 32x4.....8.00 36x4.....9.50
Send \$1 deposit for each tire order d, and we will send the tire, balance C. O. D.

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STANDARD GUARANTEED TUBES

30x3.....\$1.90 34x4.....\$3.90
30x3½.....2.40 36x4½.....4.50
32x4.....3.20 37x5.....6.00

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STOP! LOOK! READ!
Guaranteed 2,000 miles rebuilt such as Goodyear, Kelly, U. S., Firestone, etc. Four years of success. Your old tires rebuilt like new; 20% less than prices quoted. Smooth tread: 30x3, \$3.75; 30x3½, \$4.75; 32x3½, \$5.50; 32x4, \$7.00; 34x4, \$7.25. Non-Skid tread: 30x3, \$4.25; 30x3½, \$5.25; 32x3½, \$6.25; 32x4, \$8.00; 34x4, \$8.25. Open 8 a. m. to 8 p. m. **SIN-TI TIRE CO.**, Elmer R. Wachter, Prop., 754 N. Eutaw St., Baltimore, Md. Phone Mt. Vernon 4038-J.

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12 TO BOX—**25c** PER BOX
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Ford Size Tires New 30x3½ Non-Skid (Unvulcanized) **\$7.50**

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33x4 Plain Clinchers, \$10.00 Ea.
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Tire Bargains in New Factory 2nds

Size	Plain Tread	Size	Plain Tread	Size	Plain Tread
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EXPERIENCED ENGINEERS will train YOU in practical repairing of automobiles, electric systems, and welding. Our new six weeks' course is the gateway to success. Don't delay. Write.
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 Starting and lighting batteries at $\frac{1}{2}$ regular price. Any battery renewed, repaired and exchanged at $\frac{1}{2}$ price. We sell complete battery manufacturing outfits to build your own batteries, plates and parts for renewing all makes of batteries. Best guarantee given. We have the best battery manufacturing equipment in the United States. Service Agents Wanted.
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The "REAL" BEGINNING OF MANY A FIRM

Is reckoned from the date of their first advertising in these columns.

If you need more business, we may have an inspiring story for you.

Ask us how we have helped someone in your line.

**CLEARING HOUSE ADVERTISING
DEPARTMENT**

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Advertisers in this section have facilities at their disposal to take on additional work on contract—
AUTOMOBILE SPECIALTIES OF ALL KINDS MANUFACTURED ON CONTRACT BASIS
SPECIAL MACHINERY - PRESS WORK - AUTO MACHINE WORK
FOUNDRY WORK - AUTOMATIC SCREW MACHINE WORK

Advertising Rates
on Request

"HAVE YOU TRIED THE JANSEN SERVICE?"

One of the Northwest's greatest factories on Gear Cutting, Machine Work, Patterns, Models, etc. For some time past we have featured our "Service," coupled with the work of skilled mechanics, that has meant "our success" and will mean "Yours." We have also manufactured the Jansen Gasoline Engine for the last 20 years. Write today. T. W. JANSEN, 741 21st Street, Des Moines, Iowa.

SCREW MACHINE WORK
METAL STAMPINGS
PROMPT DELIVERY
MURCOTT-DUDEN CO., Inc.
 253 Broadway New York City

General MACHINE WORK

An excellent equipment of screw machines, Jones & Lamson's milling machines, lathes, single and multiple spindle drills, cylindrical grinders, etc., is at your service for the manufacture of automobile parts. Send blue prints for quotations.

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 Benton Harbor Michigan

Six Spindle Automatic 12 Inch Chuck Work

We have a Conradson six spindle automatic that we can use on a large number of multiple parts. Work should be such as will go on a 12" chuck. Might be able to make the castings also. Let us show you how cheap and accurate this machine works.

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Thoroughly equipped with modern machine shops, we can render prompt and efficient service.

**SPECIAL MACHINERY BUILDING AND
CONTRACT FOR PARTS SOLICITED**

HOOSIER MOTOR CO.

GOSHEN INDIANA

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GENERAL MACHINE WORKS

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SPIES SPECIAL Machine Works

Experimental work of every kind accurately done by skilled mechanics. Send for Booklet.

SPIES

SPECIAL MACHINE WORKS

231 W. Schiller Street Chicago, Ill.

WE ARE PREPARED

to handle contracts for Dies, Jigs, Gauges and Special Machinery. Quality workmanship—over 100 skilled mechanics. Send blue prints.

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Equipped for large output of
Highest Grade Die-Castings

Send us samples or blue-prints of your most accurate and intricate parts from which we will gladly quote prices in quantities.

Illustrated Catalog Sent on Request

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Castings in Acieral

Aluminum Bronzes, Manganese Bronzes, Phosphor Bronzes, all brasses and aluminum alloys of all kinds. Quick deliveries.

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We manufacture and distribute the following parts:

Transmission Gears, Countershafts, Slide Shafts, Differential Gears, Axle Shafts, Piston Pins, etc.

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"For the Good of Your Service"

Send your work on Tools, Dies, Stampings and light manufacturing to us. We are prepared to give prompt service, coupled with reasonable prices. Experimental work and automobile specialty manufacturing on contract solicited.

Chicago Die & Specialty Company

1948-54 W. Ohio St. Chicago, Ill.

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PROMPT DELIVERIES
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 Oshkosh, Wis.

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The U. S. A. Is Ready—So are we to take on your work on tools, dies and light metal work of all kinds. Experimental work accurately done by skilled mechanics. Send blue prints. Write today. Theston Mfg. Co., 818 Third Ave. S., Minneapolis, Minn.

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STANDARD METAL MFG. CO.
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PATTERNS Wood, Metal and Aluminum Match Plates
W. J. NOBACH PATTERN WORKS
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PARTS We especially solicit the manufacturing of Small Parts. Quality, Service, and Price combined are seldom obtainable. An efficient organization makes this possible here. Send blue prints. Garland Machine & Tool Co., 1236-38 Lake Street, Chicago, Illinois.

YOUR CONTRACT WORK

will receive the best of attention by skilled mechanics. Die, Tool and Die Work, and light metal stampings. Send it today. "The House of No Regrets." **WENDELL H. CALDBECK, 294-296 East Walnut Street, Des Moines, Iowa.**

Let Us Estimate on Your **METAL STAMPINGS** Stamping Presses, Turning Lathes. We are equipped with Brass Foundry, Machine Shop, Polishing and Plating Plant. Send samples or specifications. **SHAPIRO & ARONSON, 29 Warren Street, New York.**

Parts We are in a position to manufacture small parts in any finish desired. Prompt delivery. Send blue prints for quotations. **SCHLOEMER MFG. CO., 380-38-42 Division St., Oshkosh, Wisconsin.**

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CO-OPERATIVE MACHINE WORKS
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!!! WAR !!!

has not affected our "Service" on tools, dies, jigs, or gear cutting. Experimental work solicited. Write for prices; send blue prints. **SPRAGUE MFG. CO., 729 S. Fourth St., Minneapolis, Minn.**

Gears Any kind. Prompt shipment. Most complete equipped gear factory. Send blue prints.

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SHEET METAL Forming, Punching, Stamping. Heavy 10 ft. press with 8 ft. gang punch. Also punch press, lathe and machine work. Die work and specialty Mfg. Northfield Iron Co., 450 Nico Street, Northfield, Minn.

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All Departments of Your Plant

should be busy during these days of great business activity.

Can you take on more work now?
 Will you need more soon?

If so—

We have a list of manufacturers who will be deeply interested in communicating with you.

Full Information on Request

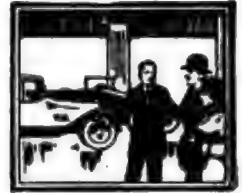
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MOTOR AGE, Mollers Building, Chicago

When Writing to Advertisers, Please Mention Motor Age



Office and Salesroom Equipment & Supplies



PLAY FAIR WITH YOUR BUSINESS

Isn't it worth something to create an impression in the mind of the recipient of your letter over and above your written message? Nothing can do this better than steel die embossed stationery—and the extra cost over type printed stuff, if you sent out fifty letters per day, would be about 10 cents. Play fair with your business; advertise it by using good stationery. Look over our samples. The only time to do so is now—write us for anything engraved, business or social.

AMERICAN EMBOSSING CO.
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BUCKSKIN CARBON PAPERS and TYPE- WRITER RIBBONS

These products are World Famous Today because they are made right and satisfy. That is why the Demand for them is continually increasing, and it should be your reason for sending us an initial order. Samples upon request.

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Perfect Service
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have been adopted as the standard method for displaying accessories by many of the finest equipped garages in the country. Illustrations and prices upon request.

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CLASSIFIED ADV. DEPTS.
MOTOR AGE Mollers Bldg. **CHICAGO**

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Good Stationery
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FIRMS

Listed on this page will gladly advise you.

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CLASSIFIED ADV. DEPTS.

MOTOR AGE, Mollers Building, Chicago



BROWN Impulse Tire Pump

The 7th season of success. Why bother with gears, brackets, etc., when a Brown Pump can be attached to your motor in an instant and always ready for use.

Outfit is complete with hose, gauge and self opening valve connection. Price..... \$12

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ANNULAR BALL BEARINGS REGROUND

Complete stock reground bearings for immediate exchange. New annular, Thrust, Redax and Double row Bearings and high grade steel balls. Special bearings made to specifications.

AHLBERG BEARING COMPANY

2636 MICHIGAN AVENUE, CHICAGO

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St. Louis Los Angeles Minneapolis Atlanta Portland San Francisco

WE still have a few of the 3 color map supplements left which was included in our April 5th Touring Number. We are unable to supply complete copies of this issue, but if you desire one of these 3 color maps we will be pleased to send it upon receipt of ten cents in stamps, which covers the cost of printing and mailing. Only one map will be sent on each order.

MOTOR AGE, MALLERS BLDG., CHICAGO



Inner armor for auto-mobile tires.

Prevent punctures and blowouts. Double mileage of any tire, old or new. Easily applied without tools. Used over and over in several tires. Will not heat or pinch. Cheaper and better than double treads, etc. Details free. Distributors and agents wanted. Sales guaranteed. Liberal profits.

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Allith-Prouty Co.



TRACK Manufacturers

Garage Door Hardware, Store Ladders, Spring Hinges, Hardware Specialties.

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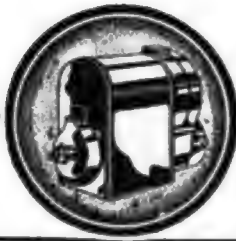


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Rain-Proof-Dust-Proof-Rust-Proof

In a variety of styles for all leading makes of cars

The Kamlee Company Milwaukee Wis.



There's One Big Thought Behind the Eisemann

Through sixteen years of consistent progress and improvement—the longest time that has been spent in developing any High Tension Magneto—there has been no change in our original purpose.

To hold the cost of the Magneto within reasonable limits and to excel in compactness and appearance—these are important objects which have received their full share of attention from the Eisemann Engineering Staff.

But no one of these considerations has been allowed to interfere with the one dominating Eisemann purpose. Our fixed determination has been to make the most efficient Magneto.

And so we are making it. For proof, consult the long list of truck, car and tractor makers who use Eisemann as standard equipment.

THE EISEMANN MAGNETO CO.

Sales and General Offices: 32-33rd St., Brooklyn, N. Y.
Chicago, Ill., 910 So. Michigan Ave.
Detroit, Mich., 802 Woodward Ave.

THE
EISEMANN
MAGNETO



A Record Behind Them

Holding many records for power, economy and long life, the Wisconsin Motor has been used in many of the most important and difficult jobs of the world.

This is the reason why the Wisconsin Motor is the most popular and reliable of all motors. It is the only motor that has been used in every part of the world.

WISCONSIN MOTOR MFG. CO.
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NEW YORK, N. Y.
MILWAUKEE, WIS.

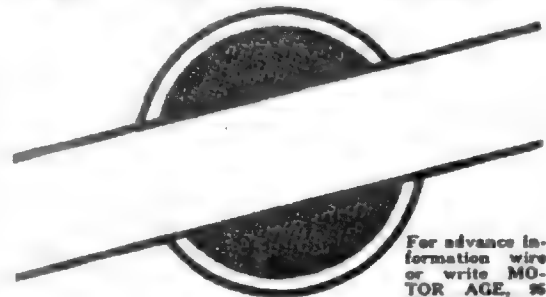
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Crane Engine-Driven
TRADE MARK
Tire Pump

No more blistered hands—or "broken" backs!
No more sweating in the sunshine—or shivering in the snow.

In 4 minutes' time—the CRANE fills a 34x4 inch tire with 80 pounds of OIL-LESS Air.

Only the CRANE can do this. Because it alone has the CRANE patented packing ring and gives 97% efficiency, instead of the usual 57%.

Sells for \$20 complete. Easily attached to any make and model car.

Order thru your jobber

BAY STATE PUMP CO.
100 Purchase St. Boston
Export Dept.
100 Broad Street
New York

Always use JOHNSON'S CLEANER Before Polishing Your Car

No matter what kind of a body polish you use, you will never get good results unless the surface upon which you apply it is clean and ready for the polish. For this purpose there is nothing equal to Johnson's Cleaner.

It Really Cleans

Johnson's Cleaner entirely removes all stains, discolorations, scum, road-oil, tar, grease, etc. Even those spots that are ground in—mud freckles—and surface scratches which you thought were permanent—will disappear like magic under Johnson's Cleaner. It doesn't injure or scratch the finest varnish—simply cleans and prepares it for the Wax polish.



Easy and Quick

It requires little experience and but a few moments to use Johnson's Cleaner. It always gives satisfaction on the finest finish or on an inexpensive car.

If your dealer cannot supply you with Johnson's Cleaner send us 10c in stamps or coin and we will send you a good sized sample by Parcel Post prepaid.

Half-pound cans, 35c each.

JOHNSON'S PREPARED WAX Liquid

After cleaning your car thoroughly with Johnson's Cleaner we recommend the use of Johnson's Liquid Prepared Wax to polish, preserve and protect the finish. Johnson's Liquid Prepared Wax covers up mars and scratches—prevents checking and cracking—sheds water and dust—and makes a "wash" last twice as long.

Johnson's Prepared Wax Liquid polishes immediately with but very little rubbing—you can go over a good sized car in half-an-hour. If you cannot purchase it locally send your order direct to us and we will prepare the express to any point in the U. S. East of the Rockies.

Quarts \$1.20. Pints 60c East of the Rockies.

S. C. JOHNSON & SON, Dept. MA, RACINE, WIS.



When Writing to Advertisers, Please Mention Motor Age



A Striking Example

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QUICK CHANGE
WIRE WHEELS

Here is an Owen-Magnetic with a specially designed "cubist" body.

The main object of the body builder was to obtain a strikingly beautiful effect—distinctly attractive to the eye and pleasing to the cultivated taste of discriminating motorists.

To complete the harmonious assembly, he naturally selected Houk Wire Wheels.



Houk Manufacturing Co.
BUFFALO NEW YORK

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You can't make money or build up a business if you are selling the same brand of tires as the man across the street. Your profit and success in the tire business depends as much on the sales plan back of the tire, as it does upon the quality of the tires themselves.

Both the Goods and the Sales Policy Back of

Miller GEARED TO THE ROAD Tires

Are Right

They are building consistent profits for dealers all over the country today; making successful merchants out of men who once upon a time believed there was no money in the tire business. They know differently now. Write for the Miller Plan today.

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